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SUMMARY OF THE 2000 U.S. NORTH AND SOUTH PACIFIC ALBACORE TROLL FISHERIES

by

John Childers

ADMINISTRATIVE REPORT LJ-01-05

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SUMMARY OF THE 2000 U.S. NORTH AND SOUTH PACIFIC ALBACORE TROLL FISHERIES

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ADMINISTRATIVE REPORT LJ-01-05

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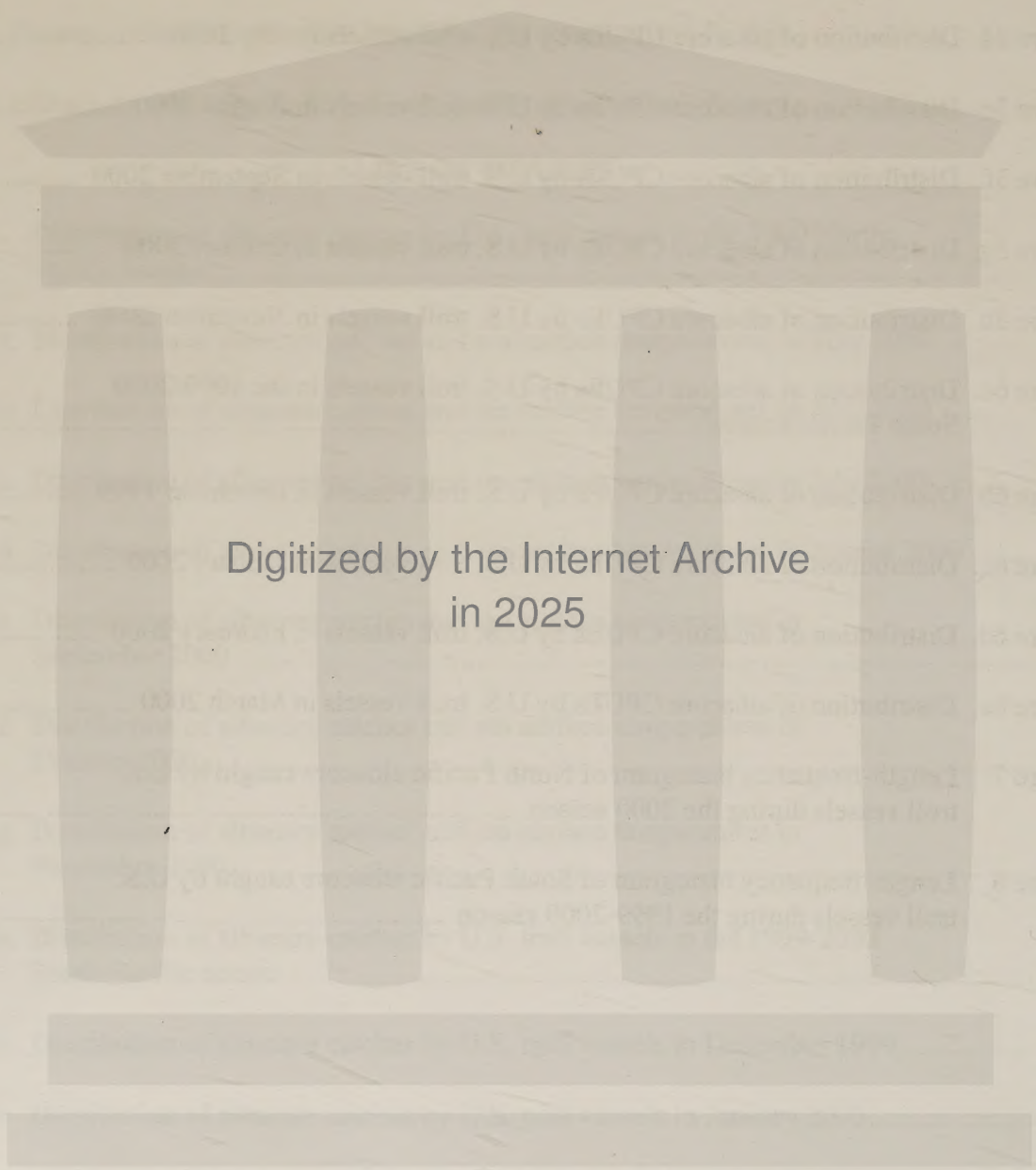

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INTRODUCTION

Albacore (*Thunnus alalunga*) are commercially harvested in the North Pacific by fisheries from various nations (Table 1). Japan is the largest harvester, annually taking 74% (since 1952) of the total amount of North Pacific albacore landed by all nations, while the U.S. annually takes less than 22%. U.S. vessels fish for albacore in the Pacific primarily with troll gear (artificial lures with barbless hooks towed behind a vessel). U.S. troll vessels have fished for albacore in the North Pacific since the early 1900's (Clemens and Craig, 1965). The collection of logbook data from the U.S. North Pacific albacore troll fishery began in 1954 (Laurs et al., 1975a). The collection of length-frequency data from the U.S. North Pacific albacore troll fishery began in 1951. The agencies currently involved in the collection of voluntary logbook, length-frequency, and catch information from the U.S. Pacific albacore troll fisheries are the National Marine Fisheries Service (NMFS), Southwest Fisheries Science Center (SWFSC, La Jolla and Honolulu laboratories), Western Fishboat Owners Association (WFOA), American Fishermen's Research Foundation (AFRF), Pacific States Marine Fisheries Commission (PSMFC), and the state fisheries agencies of California, Oregon, and Washington. In addition to the voluntary logbook program, U.S. troll vessels that fish for albacore outside the U.S. exclusive economic zone (EEZ) are required to submit logbook data to SWFSC for the time they fished outside the U.S. EEZ. Beginning in 1971, cooperative surveys between NMFS and AFRF led to the expansion of areas fished by U.S. troll vessels to areas north of Hawaii and west of the International Dateline (Laurs, et al., 1975b). In recent years, the North Pacific albacore troll season has begun as early as mid-April in areas northwest of Midway Island. In July and August, fishing effort shifts to the east (130°W to 160°W, and 40°N to 45°N), and along the west coast of North America. Fishing areas along the west coast of North America extend from Vancouver Island through southern California. Fishing can continue into November if weather permits and sufficient amounts of albacore remain available to troll gear.

Albacore are also harvested in the South Pacific by a variety of nations (Table 2). Taiwan currently harvests the largest proportion of albacore caught annually in the South Pacific (43% on average since 1990). The annual U.S. portion of the South Pacific albacore catch has averaged 7% since 1990. Exploratory fishing for albacore with troll gear in areas east of New Zealand in 1986 resulted in the expansion of the U.S. albacore troll fishery to the South Pacific (Laurs et al., 1987). The collection of logbook, catch, and length-frequency data from the U.S. South Pacific fishery began in 1987. This fishery takes place during the austral summer months (November through April). The U.S. troll vessels that participate in the South Pacific fishery depart from the U.S. west coast or Hawaii after the end of the North Pacific season and travel to American Samoa or French Polynesia to prepare for the South Pacific season. South Pacific albacore fishing areas extend from the Tasman Sea to approximately 110°W between 25°S and

45°S. At the end of the season (March or April), most troll vessels unload in American Samoa, Fiji, or Tahiti then travel to Hawaii or the U.S. west coast to prepare for the next North Pacific fishing season.

This report presents summaries of the logbook (daily catch and effort), catch and length-frequency information collected from the U.S. fleet during the 2000 North Pacific and the 1999-2000 South Pacific albacore seasons. Data from the 1999 North Pacific season, 1998-1999 South Pacific season, and from other fisheries (where available) are included for comparison.

DATA COLLECTED

Total annual catch data from the various fisheries that harvest albacore in the Pacific Ocean are available from 1952 to 2000 (Tables 1 and 2). Data from shore-side deliveries are provided by WFOA and are collected from state landing receipts submitted by fish buyers and canneries. Individual landing records are obtained from the state fisheries agencies of California, Oregon, and Washington and from the Pacific Coast Fisheries Information Network (PacFIN). At-sea transshipment data are provided by WFOA. Daily catch and effort data are obtained from completed copies of the *U.S. Pacific Albacore Logbook*. The logbooks are voluntarily submitted by fishermen who fish inside the U.S. Exclusive Economic Zone (EEZ) off the Pacific coast, completed by port samplers who collect the information from cooperating fishermen, or mailed in (as a requirement of the High Seas Fishing Compliance Act (HSFCA)) by fishermen that fished outside the U.S. EEZ. Approximately 1,100 logbooks were distributed to fishermen for the 2000 North Pacific and the 1999-2000 South Pacific albacore seasons. Samplers in the ports of Ilwaco, Washington; Newport, Oregon; Terminal Island, California; and Pago Pago, American Samoa collected voluntary logbook data and length-frequency data during the 2000 North Pacific season. Samplers in Pago Pago collected voluntary and mandatory logbook data and length-frequency data during the 1999-2000 South Pacific season.

North Pacific sea surface temperature (SST) data recorded from commercial transport ships, fishing vessels, and research vessels were obtained from the National Weather Service's National Centers for Environmental Prediction (NCEP) for each month of the 2000 North Pacific albacore season. These data were compiled into monthly averages and computer-analyzed at the SWFSC La Jolla laboratory. Contours of SSTs (isotherms) were computer-drawn with a resolution of 1° of latitude and longitude and are displayed with the general catch areas of North Pacific troll-caught albacore in figures 2a through 2g. Analysis of SSTs shows the distribution of isotherms and the locations of temperature fronts (areas of closely-spaced isotherms). Albacore tend to congregate along these fronts in the North Pacific transition zone (Laurs and Lynn, 1977). Currently, there is insufficient SST information available from the areas of the South Pacific albacore troll fishery (east of New Zealand to 110°W and south of 30°S) to make a similar analysis possible.

TOTAL CATCH AND EFFORT

Total catch from the 2000 U.S. North Pacific albacore troll fishery decreased to 9,340 metric tons (t) from 10,194 t landed in 1999. A total of 953 t were unloaded from U.S. troll vessels at sea and transshipped to the canneries by carrier vessels in 2000 compared to 753 t transshipped in 1999. An estimated 710 U.S. troll vessels fished in the 2000 North Pacific

fishery (Table 3). This is a 12% decrease from 802 troll vessels that fished in 1999. Fishing effort in the albacore troll fisheries is measured in number of fishing days. The total number of fishing days is estimated by the following equation:

$$Effort(days) = Catch(pounds) \div [CPUE(^{fish}/_{day}) \times AverageWeight(^{pounds}/_{fish})]$$

U.S. troll vessels fished 33,911 days during the 2000 North Pacific albacore season, compared to 34,221 days fished in 1999 (Table 3). The average price paid for albacore caught by troll vessels in 2000 was $1,870 USD per short ton. This is a 9% increase from the average price of $1,713 USD paid in 1999.

The South Pacific albacore troll fishery begins in November or December and continues into April of the following year. As a result, season totals differ slightly from annual totals. The season catches of South Pacific albacore caught by troll gear are converted to annual totals and listed in table 2. Season catches are listed in table 4. The 1999-2000 season catch by U.S. troll vessels increased to 2,731 t from 1,381 t landed in the 1998-1999 season. Thirty-six U.S. troll vessels participated in the 1999-2000 South Pacific season compared to 21 vessels that fished in the 1998-1999 season. Total fishing effort for the 1999-2000 South Pacific albacore season is estimated to be 5,139 days, more than twice the estimated 2,493 days fished in the 1998-1999 season (Table 4). The average price paid for albacore caught by troll vessels in the South Pacific in the 1999-2000 season was $1,813 USD, a 36% increase from the average price of $1,338 USD paid in the 1998-1999 season.

Albacore may be discarded because they are damaged or have become spoiled due to refrigeration problems, but the primary reason for discarding albacore is because they are under-sized (less than 58 cm fork length or 9 pounds). Forty-five trips recorded 2,729 albacore discarded during the 1999 season. Twenty-five trips (of 373 sampled trips) recorded a total of 4,170 albacore discarded during the 2000 North Pacific troll season. This apparent increase in the amount of under-sized albacore in troll catches is also seen in length-frequency samples collected in 2000[1]. Albacore troll vessels catch minor amounts of other fish species, usually while in transit to or from the fishing grounds. The most common species caught incidentally include skipjack tuna (*Katsuwonus pelamis*), yellowtail (*Seriola lalandi*), mahi mahi (*Coryphaena hippurus*), bluefin tuna (*Thunnus thynnus*), billfish, and sharks.

DISTRIBUTION OF CATCHES AND SSTS

Albacore catches recorded during the 2000 North Pacific albacore troll season extend from the west coast of the U.S. to 169°E, between approximately 30°N and 50°N (Figure 1). Areas of high catch indicate productive regions where albacore are available to troll gear. Based on sampled logbook data, the highest catch areas were off the coasts of Washington and Oregon from 44°N to 47°N, between 125°W and 128°W. Several small, scattered areas of high catches were located farther offshore between 148°W and 169°E.

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[1] See figure 7 in "Summary of the 1999 U.S. North and South Pacific albacore troll fisheries". Administrative report LJ-00-06.

Figures 2a through 2g show the relationship between high catch areas, SST fronts, and isotherm distribution patterns. The area of highest catch in May was in SSTs ranging from 16°C to 18°C (61°F to 64°F; Figure 2a). High catch areas in June ranged from southern California to 165°E and were in SSTs between 13°C and 19°C (55°F and 66°F, respectively; Figure 2b). During July, offshore catches were best in SSTs that ranged from 11°C to 20°C (52°F to 68°F; Figure 2c). Highest catches along the west coast in July were in SSTs ranging from 14°C to 20°C (57°F to 68°F). The areas of highest catch in August extended from the coasts of Washington and Oregon out to 165°E and were in SSTs ranging from 13°C to 20°C (55°F to 68°F; Figure 2d). In September, highest catches along the coast were in SSTs ranging between 14°C and 17°C (57°F and 63°F, respectively; Figure 2e). Two offshore areas were also highly productive in September. SSTs in the high catch area between 145°W and 150°W were between 17°C and 19°C (63°F and 66°F, respectively). SSTs in the high catch area near 170°E were between 15°C and 16°C (59°F and 61°F, respectively). In October highest catches were in SSTs between 15°C and 19°C (59°F and 66°F, respectively) and were distributed along the West Coast from Oregon to southern California and out to 170°W (Figure 2f). The highest catches in November were between 150°W and 160°W and were in SSTs ranging from 15°C to 18°C (59°F to 64°F; Figure 2g).

Albacore catches recorded during the 1999-2000 South Pacific season were summarized by season and month in 5° squares of latitude and longitude (Figures 3a through 3e). The highest albacore catches of the season were made between 145°W and 165°W, from 40°S to 45°S (Figure 3a). The highest catches in December did not exceed 18,900 fish in the 5° area between 155°W and 160°W from 35°S to 40°S (Figure 3b). Highest catches in January ranged between 145°W and 165°W from 35°S to 45°S (Figure 3c). Highest catches in February were between 145°W and 155°W from 40°S to 45°S (Figure 3d). The highest catches in March were confined to the area between by 145°W and 150°W, from 40°S to 45°S (Figure 3e).

CATCH-PER-UNIT EFFORT

Catch-Per-Unit Effort (CPUE) is used as an indication of relative abundance of albacore available to troll gear, or a measure of fishing success, and is expressed in numbers of fish caught per day fished. Catch (in numbers of fish) and effort (in days fished) were summarized from logbook data by 10-day and 1°-square strata in which there was at least one day of fishing effort (Kleiber and Perrin, 1991). Average CPUE is calculated as follows:

$$Average\ CPUE = \frac{\sum_{i=1}^{n} \frac{C_i}{E_i}}{n}$$

Where C_i is the total sampled catch in the i^{th} stratum, E_i is the total sampled effort in the i^{th} stratum, and n is the total number of strata.

The CPUE for the North Pacific albacore troll fishery declined by approximately 68% between 1962 and 1977, then remained relatively stable between 1977 and 1991 (Figure 4). The CPUE increased from 1991 to 1998 with large fluctuations between 1995 and 1999. The average

CPUE for the 2000 North Pacific season is 41 fish per day, a small increase from 37 fish per day in the 1999 season (Table 3). The ten-year average from 1991 through 2000 is 56 fish per day.

The CPUE for the U.S. South Pacific albacore troll fishery generally declined between 1987 and 1993 (Figure 4). The CPUE then peaked at 150 fish per day in 1995 and has remained relatively stable at 70 fish per day since 1996. The CPUE for the 1999-2000 South Pacific season is 70 fish per day, a 9% decrease from 77 fish per day in the 1998-1999 season (Table 4).

The CPUEs from the 2000 North Pacific season were averaged by season and month in 1° squares of latitude and longitude. The distributions of season and monthly CPUEs in 2000 were very similar to the distributions in 1999. The highest CPUEs for the season ranged from 95 to 359 fish per day and were scattered between 124°W and 169°E, from 35°N to 47°N, (Figure 5a). CPUEs in May were highest between 171°E and 171°W, from 34°N to 36°N (Figure 5b). In June, the highest CPUEs were confined to the area between 142°W and 143°W, and 40°N to 41°N (Figure 5c). Highest CPUEs in July were distributed between 169°E and the West coast from 37°N to 45°N (Figure 5d). In August, CPUEs between 112 fish per day and 498 fish per day were distributed between 126°W and 136°W, from 42°N to 46°N (Figure 5e). There were also several small offshore areas out to 169°E with high CPUEs. In September the highest CPUEs were distributed along the West Coast from 35°N to 46°N and offshore to 148°W (Figure 5f). In October, the highest CPUEs were found offshore between 147°W and 167°W, from 39°N to 46°N (Figure 5g). In November, the highest CPUEs were scattered between 152°W and 165°W, from 38°N to 41°N (Figure 5h).

The CPUEs for the 1999-2000 South Pacific season were averaged by season and month in 5° squares of latitude and longitude. The distributions of CPUEs in the 1999-2000 season were similar to those in the 1998-1999 season, but did not extend as far eastward as CPUEs in the 1998-1999 season. The highest CPUEs for the 1999-2000 season ranged from 97 fish per day to 183 fish per day and were distributed between 140°W and 165°W, from 40°S to 45°S (Figure 6a). CPUEs in December 1999 did not exceed 104 fish per day and the highest CPUEs were distributed between 150°W and 160°W, from 35°S to 40°S (Figure 6b). CPUEs in January 2000 were highest between 160°W and 165°W, from 40°S to 45°S (Figure 6c). In February, high CPUEs shifted eastward and were distributed between 140°W and 150°W, from 35°S to 45°S (Figure 6d). CPUEs in March again did not exceed 104 fish per day and were scattered between 145°W and 165°W, from 40°S to 45°S (Figure 6e).

LOGBOOK SAMPLING COVERAGE

Logbook sampling coverage is expressed as the ratio of catches from sampled trips (those trips from which logbook data were received) to total catches. Catches from sampled trips in some past seasons are not available. For consistent comparison of sampling coverage between current and past seasons, sampled catches are estimated by multiplying numbers of fish caught (recorded in logbooks) by the average weight of those fish and summing these estimates from sampled logbooks.

A total of 373 trips (of 1,377 total trips) were sampled for logbook information during the 2000 North Pacific albacore troll season. Sampled catches totaled 3,148 t, resulting in a logbook sampling coverage rate of 34 %, the same as 1999 (Table 3).

Logbook data from the 1999-2000 South Pacific albacore troll season were collected from 26 of the 44 trips made by U.S. vessels. The sampled catch from these trips is 1,579 t, resulting in a logbook sampling coverage of 58%, compared to 37% for the 1998-1999 season (Table 4).

LENGTH-FREQUENCIES

Port samplers measured over 11,000 albacore during the 2000 North Pacific season. Fork lengths of albacore measured during the 2000 North Pacific season ranged from 51 cm (6 lb or 2.7 kg) to 98 cm (42 lb or 19.2 kg) and averaged 69 cm (15 lb or 6.7 kg). By comparison, the average fork length of sampled albacore from the 1999 season is 73 cm (18 lb or 8 kg). One prominent mode is centered near 65 cm (12 lb or 5.6 kg) in the histogram of length-frequency samples from the 2000 North Pacific season (Figure 7). A second, less prominent mode is centered at 72 cm (17 lb or 7.6 kg). The majority of albacore that are taken in both the North and South Pacific troll fisheries range from three to five years old. Length-age and length-weight relationships for North Pacific albacore are taken from Bartoo and Forman, 1993. Length-age relationships for South Pacific albacore are taken from Labelle et al., 1993.

Small albacore (less than 58 cm fork length or 9 lb) may not be adequately represented in the length-frequency data collected from the North Pacific fishery. Vessels that sell most of their catch to canneries or buying stations (which may pay less for small fish) might discard small fish when they are abundant in the catches. Troll vessels that sell their fish to markets where small fish are preferred might retain more small fish. These fish are usually not available to port samplers for measuring.

Port samplers measured more than 1,300 albacore during the 1999-2000 South Pacific troll season. Sampled (measured) albacore ranged from 52 cm (6 lb or 2.9 kg) to 96 cm (40 lb or 18.1 kg) and averaged 72 cm (17 lb or 7.6 kg). The average fork length of sampled albacore from the 1998-1999 season is 70 cm (16 lb or 7.0 kg). Two distinct modes are apparent in the histogram of fish sampled in the 1999-2000 season (Figure 8). The first is centered at 63 cm (11 lb or 5.1 kg). Another, more prominent mode is centered at 72 cm (17 lb or 7.6 kg).

LENGTH-FREQUENCY SAMPLING COVERAGE

Length-frequency sampling coverage is expressed as the ratio of the number of fish measured to the total number of fish landed for the season. The total number of fish landed for the season is estimated by dividing total catches by the average weight of fish landed. During the 2000 North Pacific season 11,335 albacore were measured, resulting in a length-frequency sampling coverage of 0.8%, compared with 1.2% coverage for the 1999 North Pacific season (Table 3).

Port samplers in Pago Pago, American Samoa measured 1,355 of the estimated 360,109 albacore landed during the 1999-2000 South Pacific albacore fishery. The length-frequency sampling coverage rate for the 1999-2000 season is 0.4%, the same as the 1998-1999 season (Table 4).

SUMMARY

The 2000 U.S. North Pacific albacore troll fishery was slightly less productive than the 1999 fishery. Approximately 710 vessels landed 9,340 t during the 2000 season compared to 802 vessels that landed 10,194 t in 1999, an 8% decrease in total catch. Total effort remained roughly the same as the 1999 fishing season. The highest catches of albacore in the North Pacific generally are distributed between the 15°C (59°F) and 18°C (64°F) isotherms. The average CPUE for the 2000 North Pacific season increased slightly from 37 fish per day in 1999 to 41 fish per day, but remained below the ten-year average of 56 fish per day. Productive catch areas (areas with high CPUEs) ranged between the West Coast and 169°E, from 35°N to 47°N. The average fork length of sampled albacore decreased to 69 cm (15 lb or 6.7 kg) from 73 cm (18 lb or 8.0 kg) in 1999; however, fish less than 58 cm fork length (9 lb or 4.0 kg) may not be adequately represented in the North Pacific length-frequency samples due to discarding of small fish or marketing practices that prohibited sampling them. Logbook sampling coverage for the North Pacific albacore fishery remained at 34% in 2000. Length-frequency sampling coverage decreased to 0.8% in 2000 from 1.2% in 1999. Port sampling of the U.S. North Pacific fishery continues to be hampered by funding constraints.

Total catch from the 1999-2000 South Pacific season is 2,731 t, nearly twice the 1,381 t landed in the 1998-1999 season. Thirty-six U.S. troll vessels fished 5,139 days in the 1999-2000 season compared to 21 vessels that fished 2,493 days in the 1998-1999 season. The CPUE for the 1999-2000 season decreased slightly to 70 fish per day, compared to 77 fish per day in the 1998-1999 season. Though total catch in 1999-2000 doubled the previous season's catch, catch rates (CPUEs) declined slightly during the 1999-2000 season due to the increase in total effort and number of vessels that fished in the 1999-2000 season. The average size of albacore measured during the 1999-2000 season is 72 cm (16.9 lb or 7.6 kg), nearly the same as the 1998-1999 season's average size of 70 cm (16 lb or 7.1 kg). Logbook sampling coverage for the 1999-2000 South Pacific albacore troll fishery increased from 37% in the 1998-1999 season to 58%. Length-frequency sampling coverage remained the same as the 1998-1999 season at 0.4% in the 1999-2000 season.

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Table 1. North Pacific albacore catches (in metric tons) by fisheries, 1952-2000[1]. Blank indicates no effort. -- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

YEAR	CANADA[2]		JAPAN[3]					KOREA[4]		MEXICO
	TROLL	PURSE SEINE	GILL NET	LONG LINE	POLE & LINE	PURSE SEINE	UNSP. GEAR	GILL NET	LONG LINE	UNSP. GEAR
1952	71			26,687	41,787	154	237			
1953	5			27,777	32,921	38	132			
1954				20,958	28,069	23	38			
1955				16,277	24,236	8	136			
1956	17			14,341	42,810		57			
1957	8			21,053	49,500	83	151			
1958	74			18,432	22,175	8	124			
1959	212			15,802	14,252		67			
1960	5	136		17,369	25,156		76			
1961	4			17,437	18,639	7	268			0
1962	1			15,764	8,729	53	191			0
1963	5			13,464	26,420	59	218			0
1964	3			15,458	23,858	128	319			0
1965	15			13,701	41,491	11	121			0
1966	44			25,050	22,830	111	585			0
1967	161			28,869	30,481	89	520			
1968	1,028			23,961	16,597	267	1,109			
1969	1,365			18,006	31,912	521	935			0
1970	390			15,372	24,263	317	456			0
1971	1,746			11,035	52,957	902	308			0
1972	3,921		1	12,649	60,591	277	623			100
1973	1,400		39	16,059	68,808	1,353	495			0
1974	1,331		224	13,053	73,576	161	879			1
1975	111		166	10,060	52,157	159	228		2,463	1
1976	278		1,070	15,896	85,336	1,109	272		859	36
1977	53		688	15,737	31,934	669	355		792	0
1978	23		4,029	13,061	59,877	1,115	2,078		228	1
1979	521		2,856	14,249	44,662	125	1,126	0	259	1
1980	212		2,986	14,743	46,743	329	1,179	6	597	31
1981	200		10,348	18,020	27,426	252	663	16	459	8
1982	104		12,511	16,762	29,615	561	440	113	387	7
1983	225		6,852	15,103	21,098	350	118	233	454	33
1984	50		8,988	15,111	26,015	3,380	511	516	136	113
1985	56		11,204	14,320	20,714	1,533	305	576	291	49
1986	30		7,813	12,945	16,096	1,542	626	726	241	3
1987	104		6,698	14,642	19,091	1,205	155	817	182	7
1988	155		9,074	13,904	6,216	1,208	134	1,016	109	15
1989	140		7,437	13,194	8,629	2,521	393	1,023	81	2
1990	302		6,064	15,928	8,532	1,995	249	1,016	20	2
1991	139		3,401	17,043	7,103	2,652	392	852	3	2
1992	363		2,721	19,149	13,888	4,104	1,527	271	43	10
1993	494		287	29,616	12,809	2,889	867		43	11
1994	1,998		263	29,612	26,391	2,026	799		43	6
1995	1,790		282	29,080	20,981	1,177	937		43	5
1996	3,534		116	32,492	20,272	581	932		43	21
1997	2,524		359	38,988	32,250	1,068	1,708		43	53
1998	4,240		206	35,043	22,953	1,554	1,278		43	--
1999	(2,836)		(206)	(35,043)	(55,784)	(6,698)	(1,278)		(43)	--
2000	(2,836)		(206)	(35,043)	(55,784)	(6,698)	(1,278)		(43)	--

[1] Data are from the 17th North Pacific Albacore Workshop, December 6-13 2000, Taipei, Taiwan except as noted.

[2] 1960 Canadian purse seine catch from Cal. Fish & Game Vol. 48, number 1

[3] Japanese pole & line catches include fish caught by research vessels. Pole & line and longline catches for 1931-1951 from U.S.F.W.S. Res. Rep. 52. Longline catches for 1952-1960 exclude minor amounts taken by vessels under 20 metric tons. 1991 longline and 1995-1998 catches from M. Ogura, pers. Com.

[4] Korean longline catches calculated from Y. Gong (pers. comm.) using the ratio of catches in numbers, from the North Pacific. Gillnet catches for 1979-1990 are calulated by multiplying the 1991 CPUE (# fish per pok) by effort (# poks) then multiplying by average weight (1991, 1992: 4.13 kg/fish).

Table 1. Continued

YEAR	TAIWAN		U.S.							OTHERS		GRAND TOTAL
	GILL NET	LONG LINE	POLE & LINE	GILL NET	LONG[5] LINE	PURSE SEINE	SPORT	TROLL[6]	UNSP. GEAR	LONG[7] LINE	TROLL[8]	
1952					46		1,373	23,843				94,127
1953					23		171	15,740				76,802
1954					13		147	12,246				61,494
1955					9		577	13,264				54,507
1956					6		482	18,751				76,447
1957					4		304	21,165				92,260
1958					7		48	14,855				55,649
1959					5		0	20,990	5			51,121
1960					4		557	20,100	4			63,266
1961			2,837		5		1,355	12,055	6			52,609
1962			1,085		7		1,681	19,752	8			47,270
1963			2,432		7		1,161	25,140	7			68,908
1964		26	3,411		4		824	18,388	4			62,394
1965		261	417		3		731	16,542	3			73,020
1966		271	1,600		8		588	15,333	9			66,114
1967		635	4,113		12		707	17,814	12			82,617
1968		698	4,906		11		951	20,434	10			68,246
1969		634	2,996		14		358	18,827	12			73,581
1970		1,516	4,416		9		822	21,032	9			66,696
1971		1,759	2,071		11		1,175	20,526	11			88,996
1972		3,091	3,750		8		637	23,600	8			102,144
1973		128	2,236		14		84	15,653	14			104,755
1974		570	4,777		9		94	20,178	9			112,960
1975		1,494	3,243		33		640	18,932	43			88,124
1976		1,251	2,700		23		713	15,905	27			123,910
1977		873	1,497		37		537	9,969	36			62,251
1978		284	950		54		810	16,613	69			98,884
1979		187	303		--		74	6,781	31			70,466
1980	--	318	382		--		168	7,556	24			74,713
1981	--	339	748		25		195	12,637	60			70,849
1982	--	559	425		94		257	6,609	84			67,858
1983	--	520	607		6		87	9,359	213			54,480
1984	--	471	1,030		2	3,728	1,427	9,304	138			70,286
1985	--	109	1,498	2	0		1,176	6,415	83			58,117
1986	--	--	432	3			196	4,708	106			45,434
1987	2,514	--	158	5	136		74	2,766	136			46,065
1988	7,389	38	598	15	318		64	4,212	318			37,186
1989	8,350	544	54	4	272		160	1,860	272			35,900
1990	16,701	287	115	29	182	71	24	2,603	181			37,009
1991	3,398	353	0	17	313	0	6	1,845	384			34,011
1992	7,866	300	0	0	332	0	2	4,572	408			47,017
1993		494		0	440		25	6,254	331			53,561
1994		586	0	38	546		106	10,978	712			71,514
1995		2,504	79	52	879		102	7,567	1		89	61,179
1996		3,594	24	83	1,187	11	88	17,030	0	1,735	447	(72,860)
1997		4,199	73	60	1,647	2	1,018	14,014	1	2,824	404	(91,231)
1998		4,797	79	79	1,119	33	1,208	14,138	1	5,871	239	(77,734)
1999		(4,768)	120	122	1,493	47	3,621	10,194	5	(6,307)	(289)	(114,655)
2000		(4,768)	(66)	(48)	(1,493)	(4)	(1,798)	(9,340)	(4)	(6,307)	(562)	(111,805)

[5] Longline catches for 1981 through 2000 include landings in California and Hawaii. Hawaii longline catches (1987 - 1999) are from Pelagic Fisheries of the Western Pacific Region, 1999 annual report.

[6] U.S. troll catches for 1952-1960 include fish caught by pole & line vessels. U.S. troll catches for 1984-1988 include gillnet catches.

[7] Data from vessels flying flags of convenience being called back to Taiwan (NPALB/00/02)

[8] "Other" troll catches from vessels registered in Belize, Cook Islands, Tonga, and Ecuador

Table 2. South Pacific albacore catches (in metric tons) by fisheries, 1952-2000[1]. Blank indicates no effort. -- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates in ().

YEAR	JAPAN			TAIWAN		KOREA		U.S.		CANADA	NEW ZEALAND		FRENCH POLYNESIA	
	GILL NET	LONG[2] LINE	POLE & LINE	GILL NET	LONG LINE	GILL NET	LONG LINE	LONG[3] LINE	TROLL	TROLL	LONG LINE	TROLL	LONG LINE	TROLL
1952		154	--											
1953		803	--											
1954		9,578	--		--									
1955		8,625	--		--									
1956		7,281	--		--									
1957		8,757	--		--									
1958		18,490	--		--		146							
1959		17,385	--		--		456							
1960		21,638	45		--		610							
1961		23,412	0		--		330							
1962		34,620	0		--		599							
1963		29,120	16		608		1,367							
1964		19,390	0		629		2,911							
1965		17,793	0		1,640		6,405							
1966		21,627	0		6,669		10,817							
1967		15,104	0		11,497		13,717					5		
1968		6,659	0		12,254		10,138					14		
1969		4,894	0		9,503		9,963					--		
1970		6,507	0		14,484		11,599					50		
1971		4,355	0		15,871		14,482					--		
1972		2,729	22		16,674		14,439					268		
1973		2,452	41		17,741		17,452					484		
1974		1,934	709		16,857		12,194					898		
1975		1,060	0		16,056		9,015					646		
1976		1,836	0		13,206		9,058					25		
1977		2,182	0		21,429		11,229					621		
1978		2,489	0		20,702		11,658					1,686		
1979		2,320	0		14,987		11,411					814		
1980		2,555	1		17,998		10,449					1,468		
1981		4,898	0		14,390		13,342					2,085		
1982		4,822	1		12,634		10,769					2,434		
1983	32	4,991	0		12,069		7,069	5				744		
1984	1,581	3,598	2		11,155		5,321	9				2,773		
1985	1,928	3,676	0		9,601		13,544	11				3,253		
1986	1,936	4,466	0		11,913		15,877		92			1,911		
1987	919	4,103	9		15,009		6,821		793			1,256		
1988	4,271	6,914	0	1,000	17,120		6,563	1	3,574	140		405		
1989	13,263	5,353	0	8,520	10,867	172	5,151		3,510	162	9	4,923		102
1990	5,567	5,466	0	1,859	11,619		3,947		3,785		156	2,988	20	299
1991		4,700	0	1,394	16,508		1,866	1	4,821	103	66	2,385	100	326
1992		5,268	0		20,956		2,271		2,993	--	72	3,345	195	72
1993		8,294	12		17,701		1,083	0	1,027	--	206	3,117	714	45
1994		8,883	2		19,731		0	34	2,509	--	401	4,914	913	
1995		7,350	0		12,775		8	52	1,936	--	330	5,865	772	183
1996		4,538	0		11,909		215	99	2,214	--	402	5,914	1,463	69
1997		5,094	12		15,662		845	308	1,929	--	469	3,257	2,595	24
1998		6,955	27		13,812		845	489	1,656	167	1,203	5,321	3,189	
1999		6,955	--		13,684		845	302	1,446	117	1,332	2,396	2,580	
2000		(6,955)	--		(13,684)		(845)	(302)	(2,629)	(117)	(1,332)	(2,396)	(2,580)	

[1] Data are from Thirteenth Meeting of the Standing Committee on Tuna and Billfish, except as noted. All catches are from areas within the SPAR statistical area except as noted

[2] Japan longline catches include catches from Australia-Japan joint venture vessels.

[3] 1982 - 1993 U. S. longline catches are American Samoa catches from Pelagic Fisheries of the Western Pacific Region 1996 and 1998 Annual Reports 1994 - 2000 catches from American Samoa, Marshall Islands and Federated States of Micronesia.

Table 2. Continued.

YEAR	AUSTRALIA		NEW CALEDONIA	TONGA	FIJI	WESTERN SAMOA	SOLOMON ISLANDS	CHILE[5]	VANUATU	OTHER		GRAND TOTAL
	LONG LINE	TROLL[4]	LONG LINE	LONG LINE	LONG LINE	LONG LINE	LONG LINE	DRIFT NET	LONG LINE	LONG[6] LINE	TROLL[7]	
1952												154
1953												803
1954												9,578
1955												8,625
1956												7,281
1957												8,757
1958												18,636
1959												17,841
1960												22,293
1961												23,742
1962												35,219
1963												31,111
1964												22,930
1965												25,838
1966												39,113
1967												40,323
1968												29,065
1969												24,360
1970		100										32,740
1971		100										34,808
1972		100										34,232
1973		100					4					38,274
1974		100										32,692
1975		100										26,877
1976		100					6					24,231
1977		100					9					35,570
1978		100					9					36,644
1979		100					21					29,653
1980		100					25					32,596
1981		5					2					34,722
1982		6		106			8					30,780
1983		7	12	143			19					25,091
1984		8	112	135			19					24,713
1985	0	9	131	174			12					32,339
1986	0	10	179	206								36,590
1987	129	11	563	252								29,865
1988	107	12	584	242							73	41,006
1989	93	13	566	195	3							52,902
1990	51	15	1,053	152	68					4		37,049
1991	213	20	909	171	208						4	33,795
1992	192	70	692	199	243							36,568
1993	226	55	755	231	463	213				1		34,144
1994	351	70	840	343	842	641				29	46	40,549
1995	401	25	332	379	702	1,883	322	15	109	43	121	33,603
1996	408	25	414	494	1,446	1,613	1,154	(21)	192	49	208	(32,847)
1997	302	25	267	494	1,842	3,736	441	(0)	95	102	327	(37,826)
1998	479	35	860	494	2,121	4,311	370	(0)	(10)	41	367	(42,752)
1999	374	25	690	494	2,279	3,660	111	0	10	59	95	37,454
2000	(374)	(25)	(690)	(494)	(2,279)	(3,660)	(111)	(0)	(10)	(59)	(95)	(38,637)

[4] Australia troll catches from 1970 to 1980 are incidental catches from pole-and-line vessels targeting southern bluefin tuna. 1981-1998 catches include recreational catches.

[5] Chile gill net catches are from outside the SPAR statistical area and are from R. Serra (pers. comm.)

[6] "Other" includes Cook Islands, Papua New Guinea, and China. China longline catches from SPC Tuna Fishery Yearbook 1999.

[7] "Other" includes Fiji, Cook Islands, Belize, Sweden, Tonga, and Ecuador.

Table 3. Fishery statistics for the U.S. North Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		CATCH (Metric Tons)		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG	L-F
1991	536	118	1,845	1,246	325,927	11,429	65	12.5	9,420	179	35	68%	3.5%
1992	1,595	298	4,572	1,940	864,041	25,053	64	11.7	17,032	603	51	42%	2.9%
1993	2,180	175	6,254	1,290	910,470	204	69	15.1	23,988	609	38	21%	0.0%
1994	2,275	409	10,978	4,620	1,455,364	1,117	72	16.6	23,321	713	62	42%	0.1%
1995	1,199	357	7,567	4,929	1,114,623	16,221	69	15.0	23,629	476	47	65%	1.5%
1996	1,920	399	17,030	6,977	2,950,060	35,069	66	12.7	32,003	658	92	41%	1.2%
1997	3,935	493	14,014	5,467	2,015,270	32,071	70	15.3	44,640	1,170	45	39%	1.6%
1998	2,843	266	14,138	4,977	2,170,359	16,505	68	14.4	20,004	841	108	35%	0.8%
1999	2,956	382	10,194	3,447	1,279,269	15,278	73	17.6	34,221	802	37	34%	1.2%
2000	1,377	373	9,340	3,148	1,405,397	11,335	69	14.7	33,911	710	41	34%	0.8%

Table 4. Fishery statistics for the U.S. South Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		CATCH[1] (Metric Tons)		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG	L-F
1990-91	73	62	5,158	4,787	693,803	12,238	71	16.4	6,609	54	105	93%	1.8%
1991-92	56	39	3,083	1,955	469,296	5,009	68	14.5	6,888	54	68	63%	1.1%
1992-93	43	8	1,036	194	199,519	1,720	63	11.4	4,433	44	45	19%	0.9%
1993-94	12	7	2,477	251	418,736	996	66	13.0	4,311	13	97	10%	0.2%
1994-95	42	22	1,959	1,153	279,378	1,460	70	15.5	1,867	21	150	59%	0.5%
1995-96	48	30	2,206	1,124	318,973	2,226	70	15.2	4,498	53	71	51%	0.7%
1996-97	25	18	1,821	941	295,132	1,558	67	13.6	3,776	27	78	52%	0.5%
1997-98	39	31	1,749	1,099	284,845	200	67	13.5	5,353	37	53	63%	0.1%
1998-99	24	12	1,381	517	193,130	790	70	15.8	2,493	21	77	37%	0.4%
1999-2000	44	26	2,731	1,579	360,109	1,355	72	16.7	5,139	36	70	58%	0.4%

[1] Total catches for U.S. South Pacific albacore troll fishery may include catch from November and December of the previous year. Total catches for seasons before 1996-97 may contain catch from non-U.S. vessels.

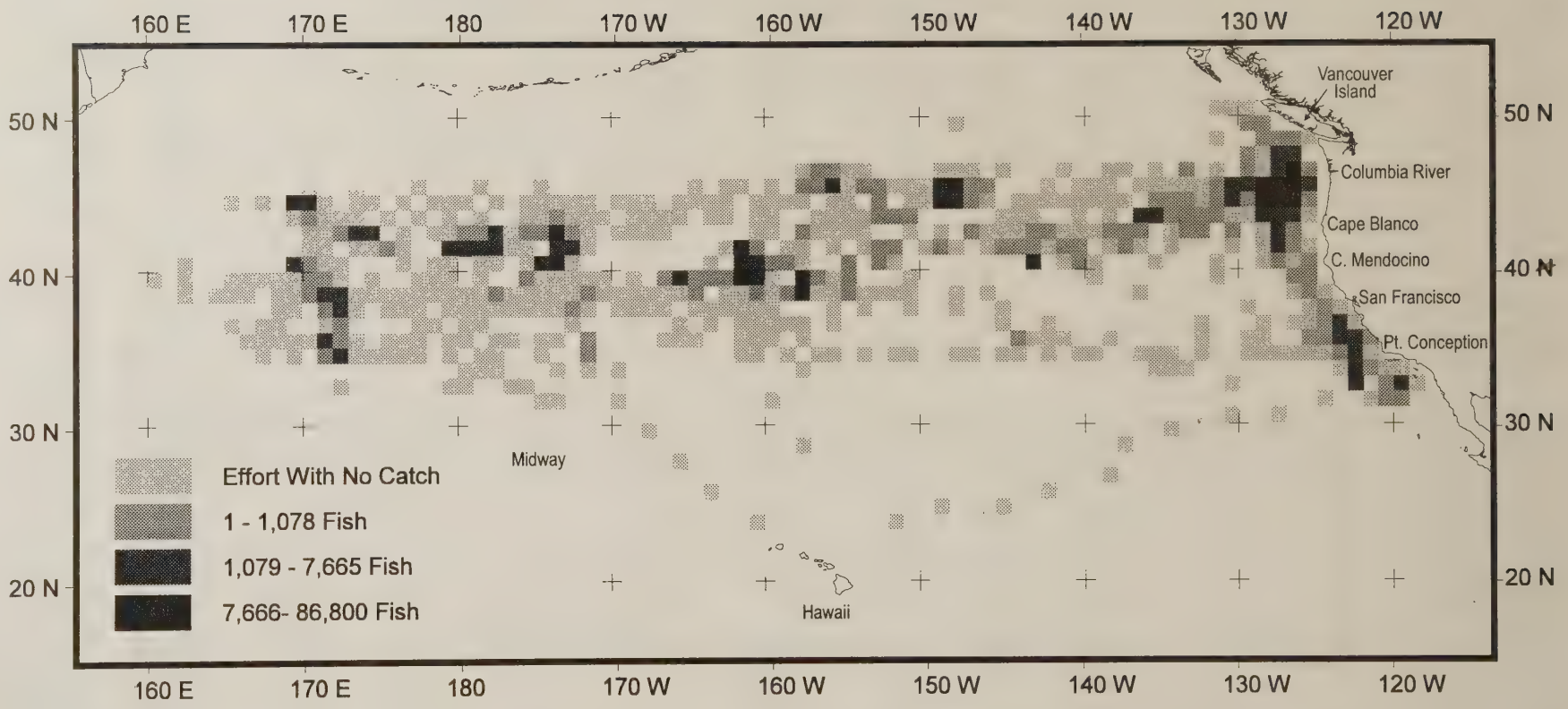

Figure 1. Distribution of albacore catches by U.S. troll vessels in the 2000 North Pacific season.

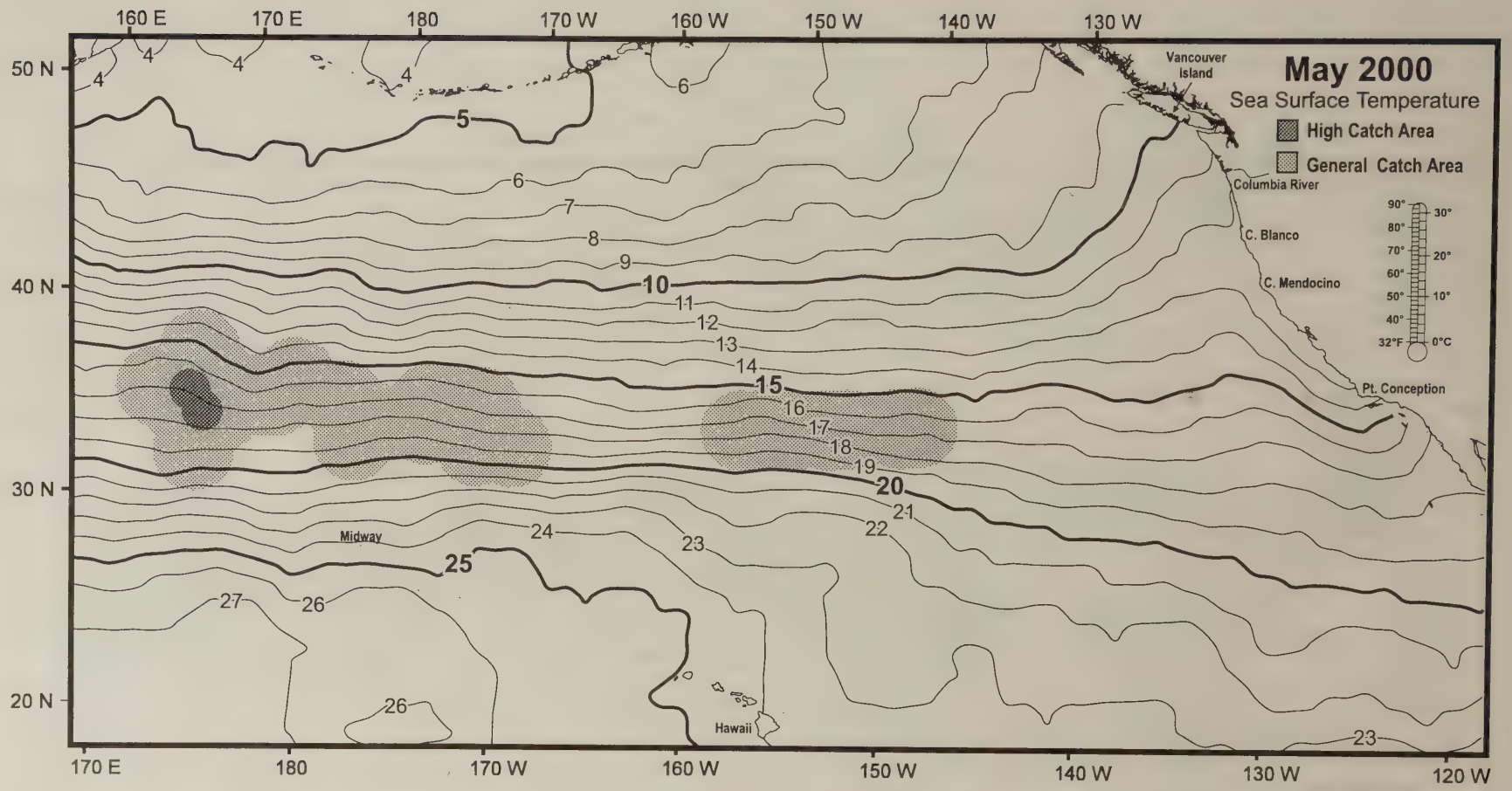

Figure 2a. Distribution of albacore catches and sea surface temperatures in May 2000.

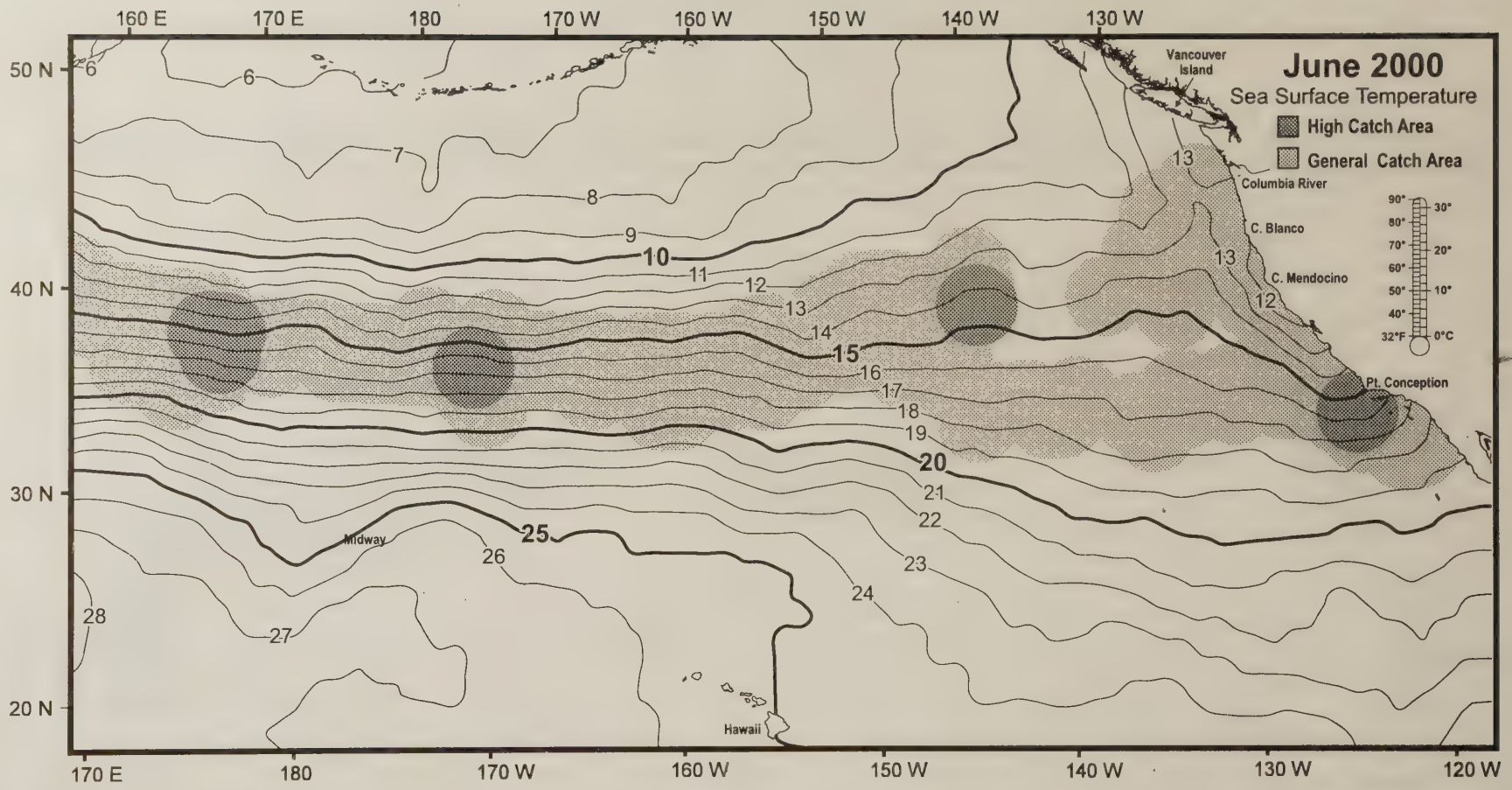

Figure 2b. Distribution of albacore catches and sea surface temperatures in June 2000.

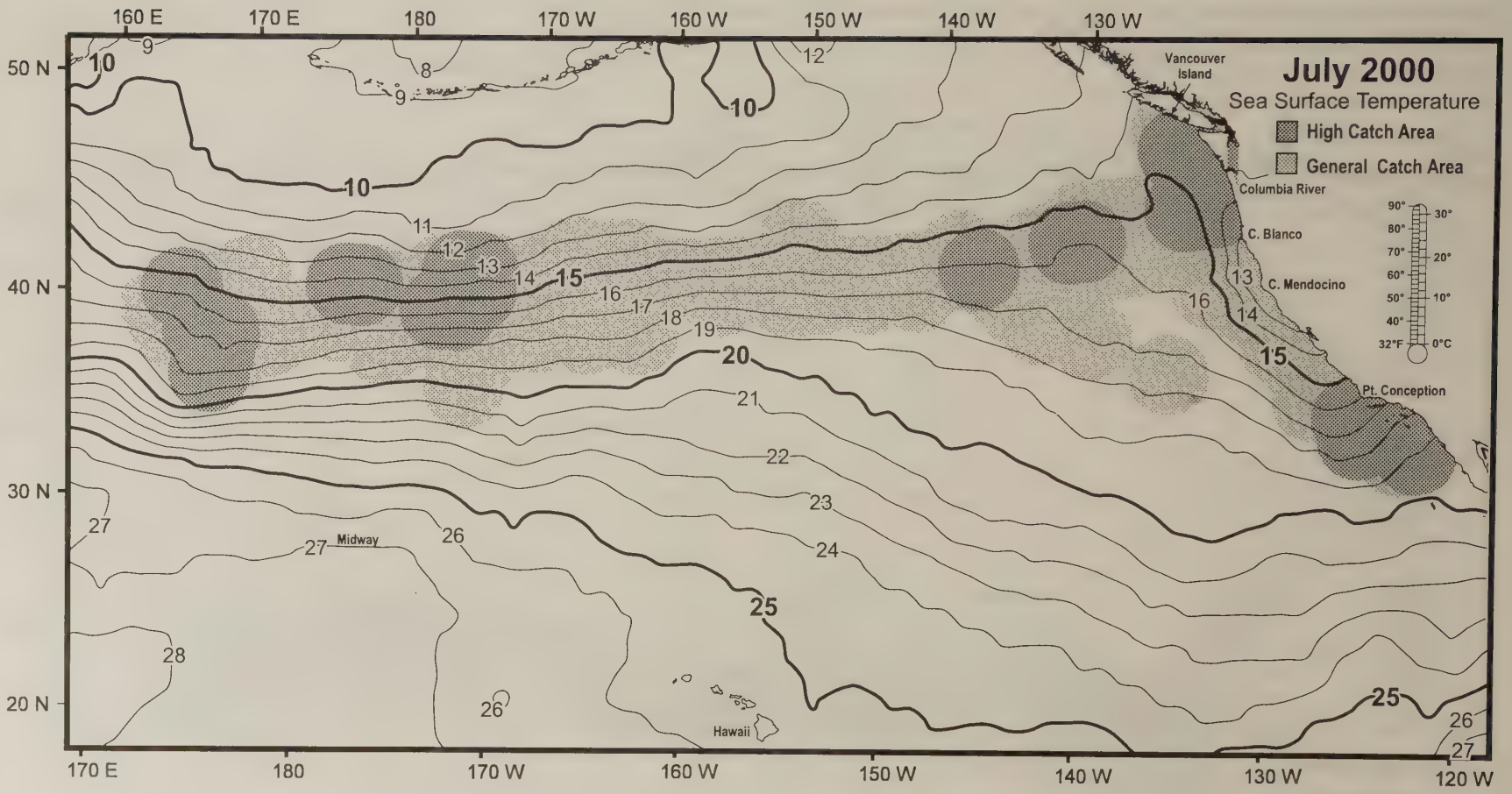

Figure 2c. Distribution of albacore catches and sea surface temperatures in July 2000.

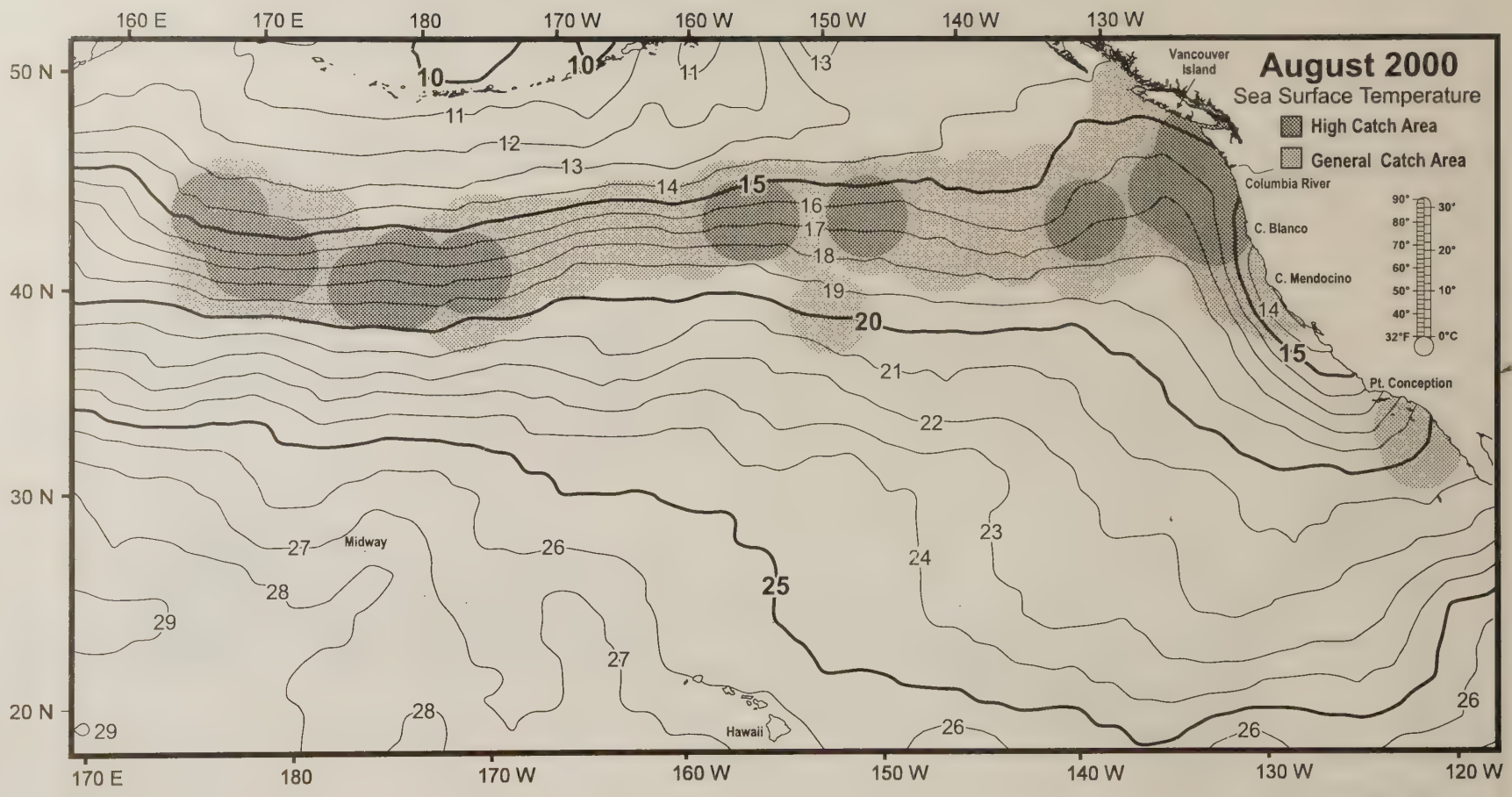

Figure 2d. Distribution of albacore catches and sea surface temperatures in August 2000.

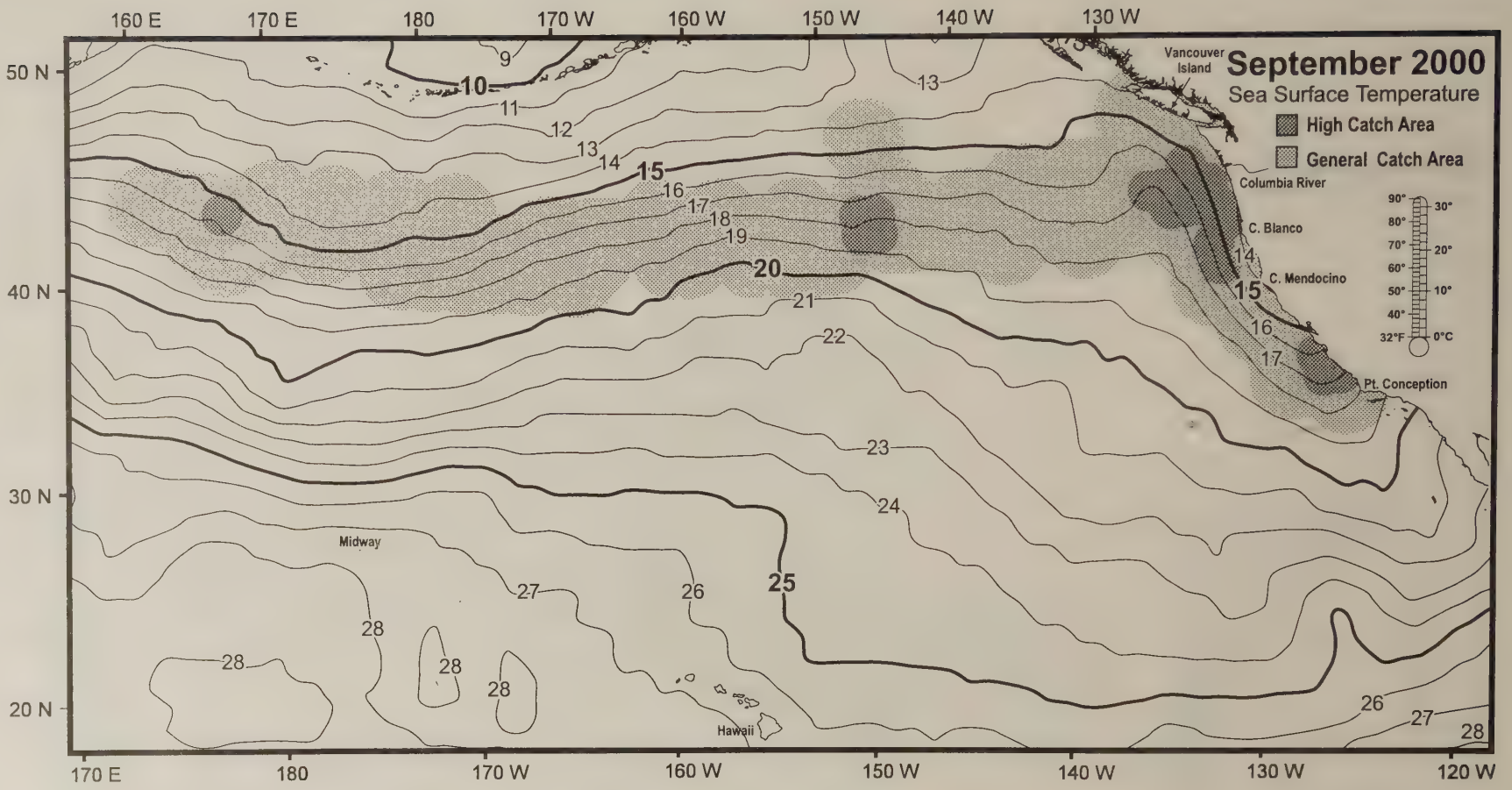

Figure 2e. Distribution of albacore catches and sea surface temperatures in September 2000.

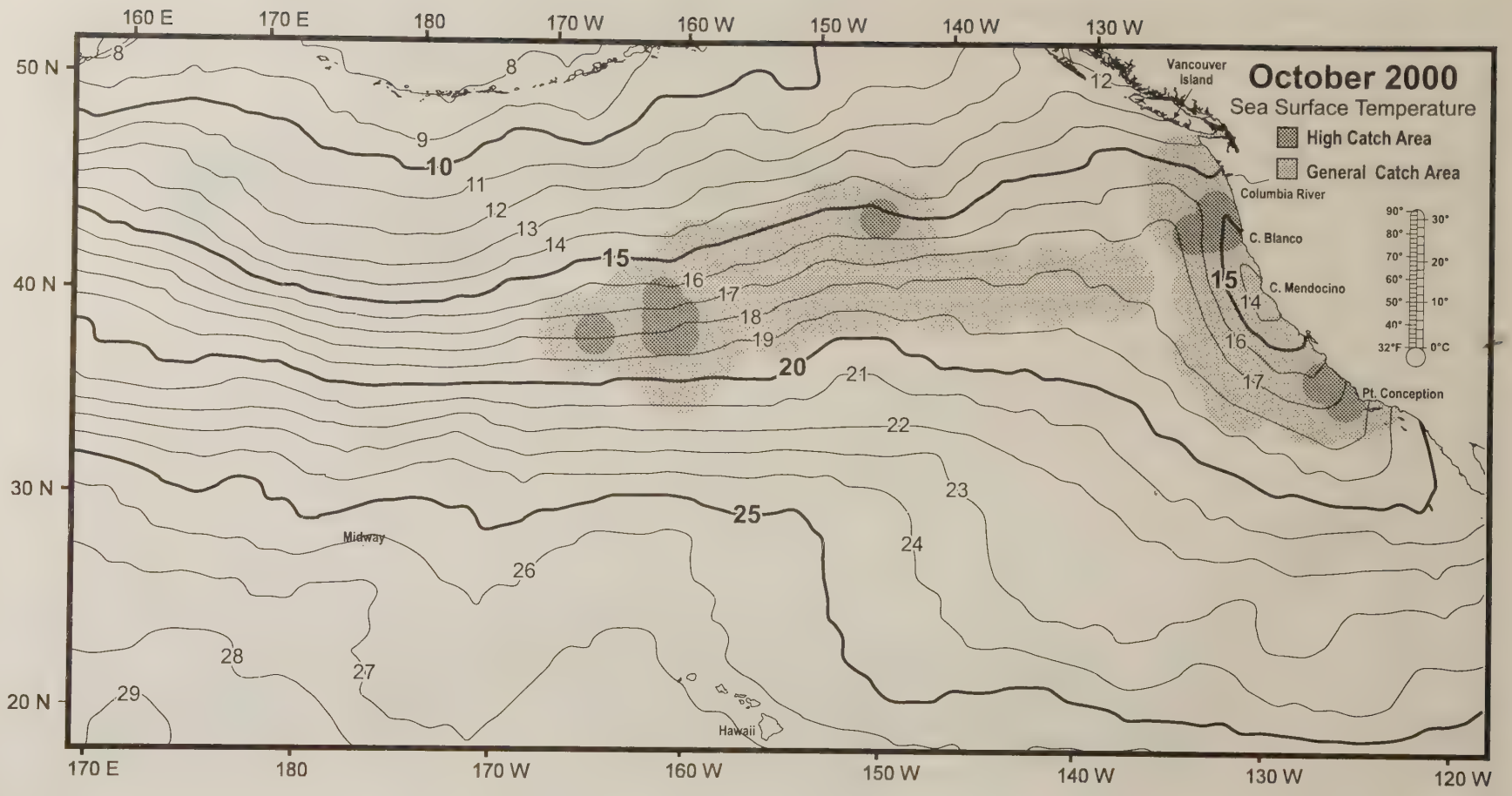

Figure 2f. Distribution of albacore catches and sea surface temperatures in October 2000.

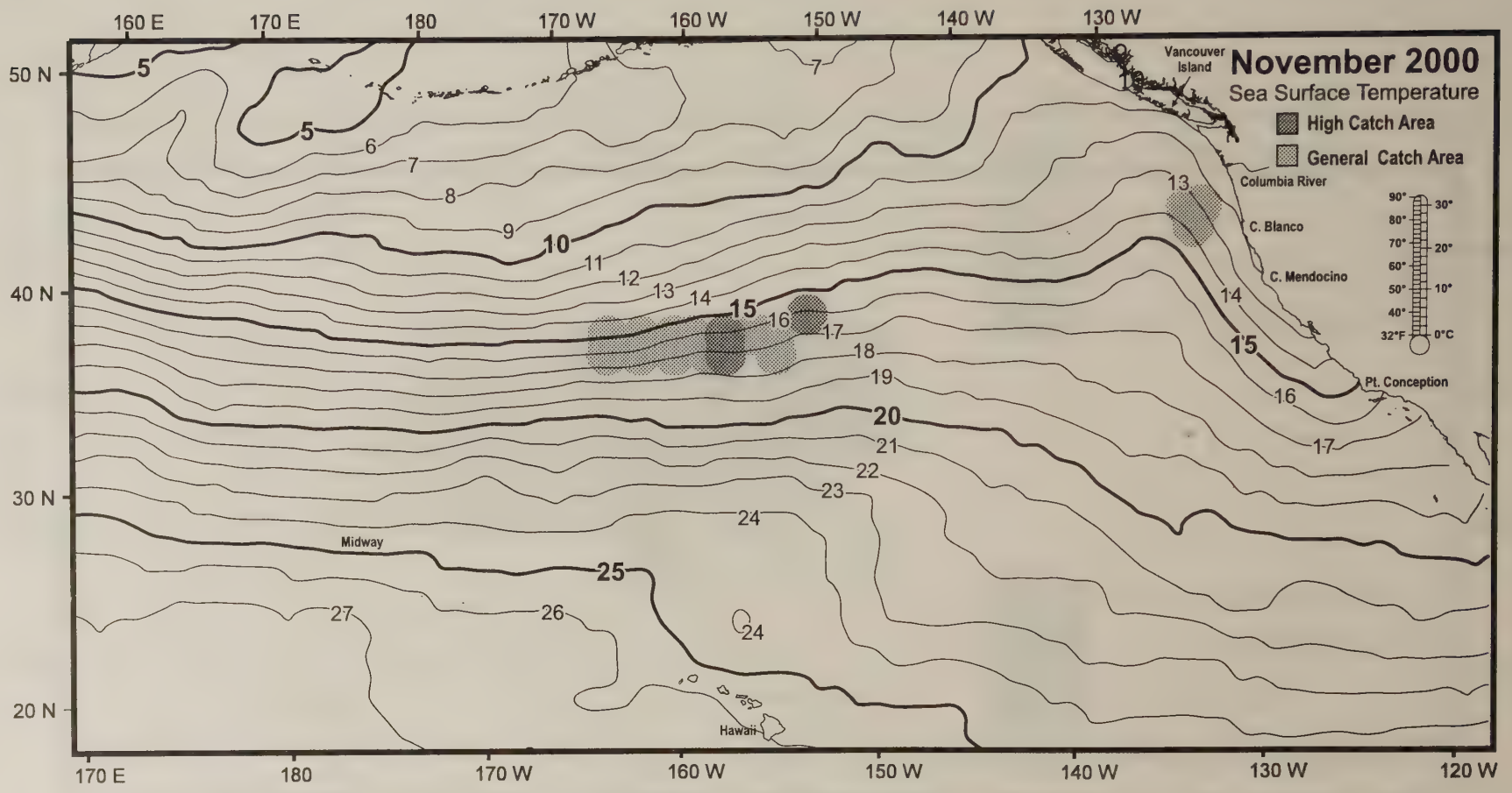

Figure 2g. Distribution of albacore catches and sea surface temperatures in November 2000.

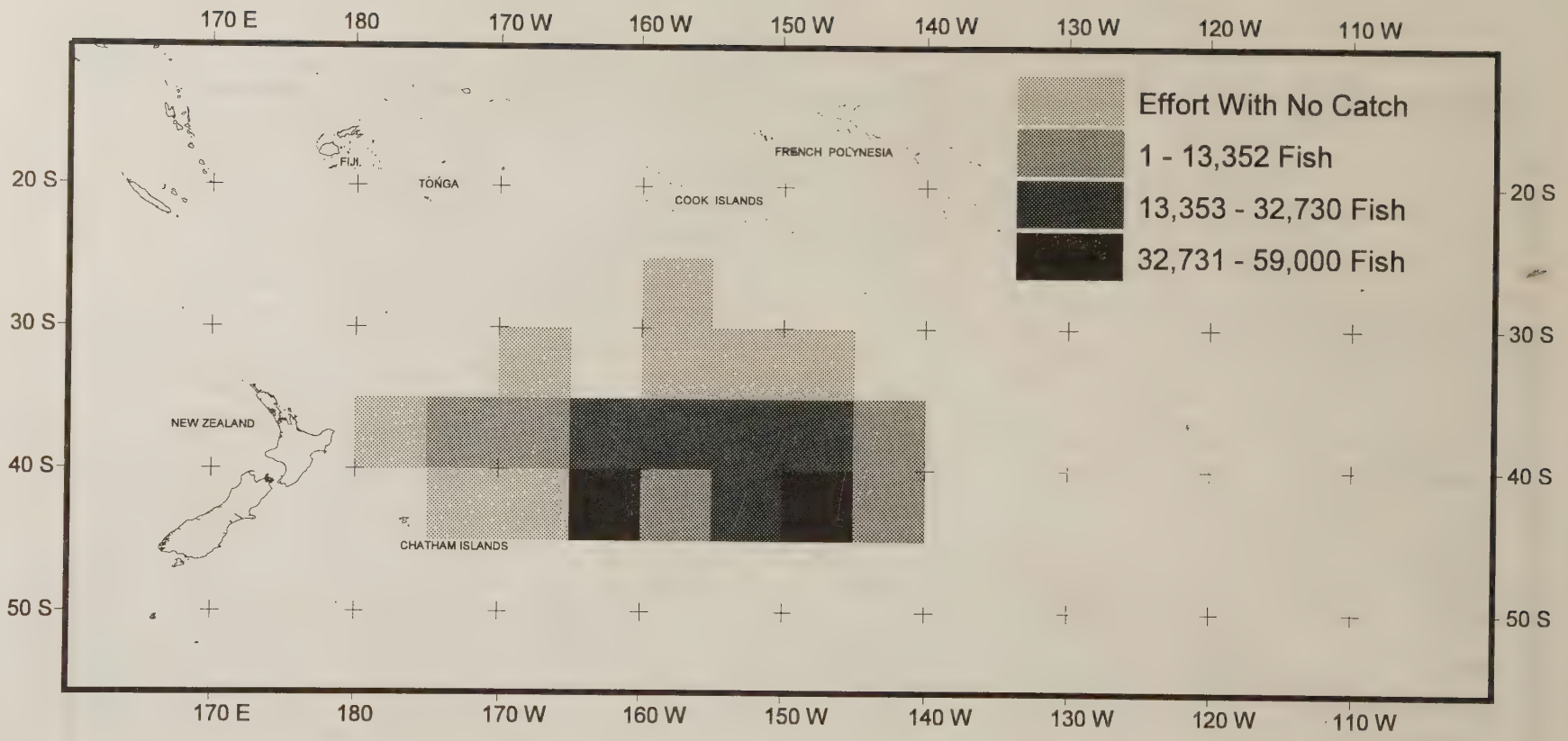

Figure 3a. Distribution of albacore catches by U.S. troll vessels in the 1999-2000 South Pacific season.

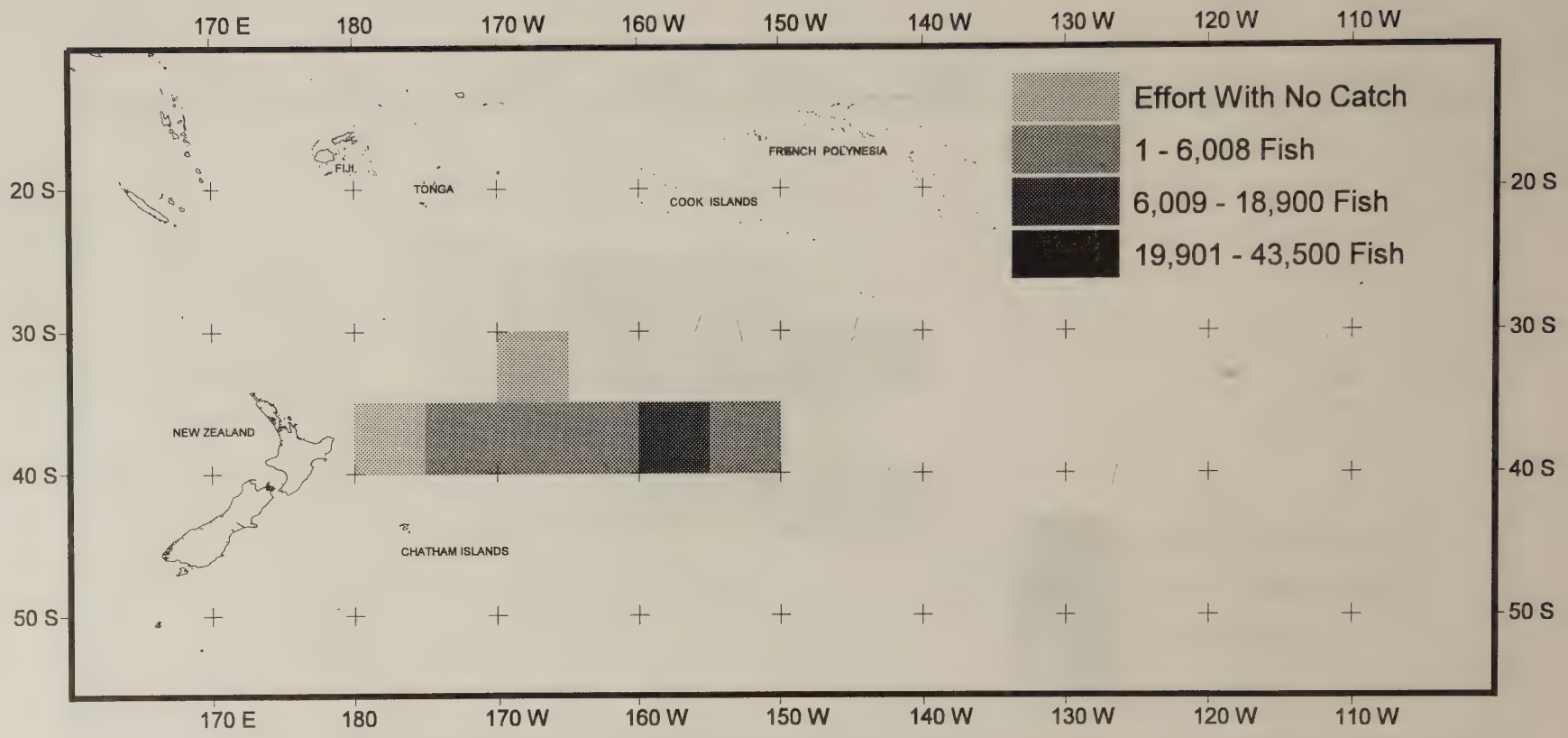

Figure 3b. Distribution of albacore catches by U.S. troll vessels in December 1999.

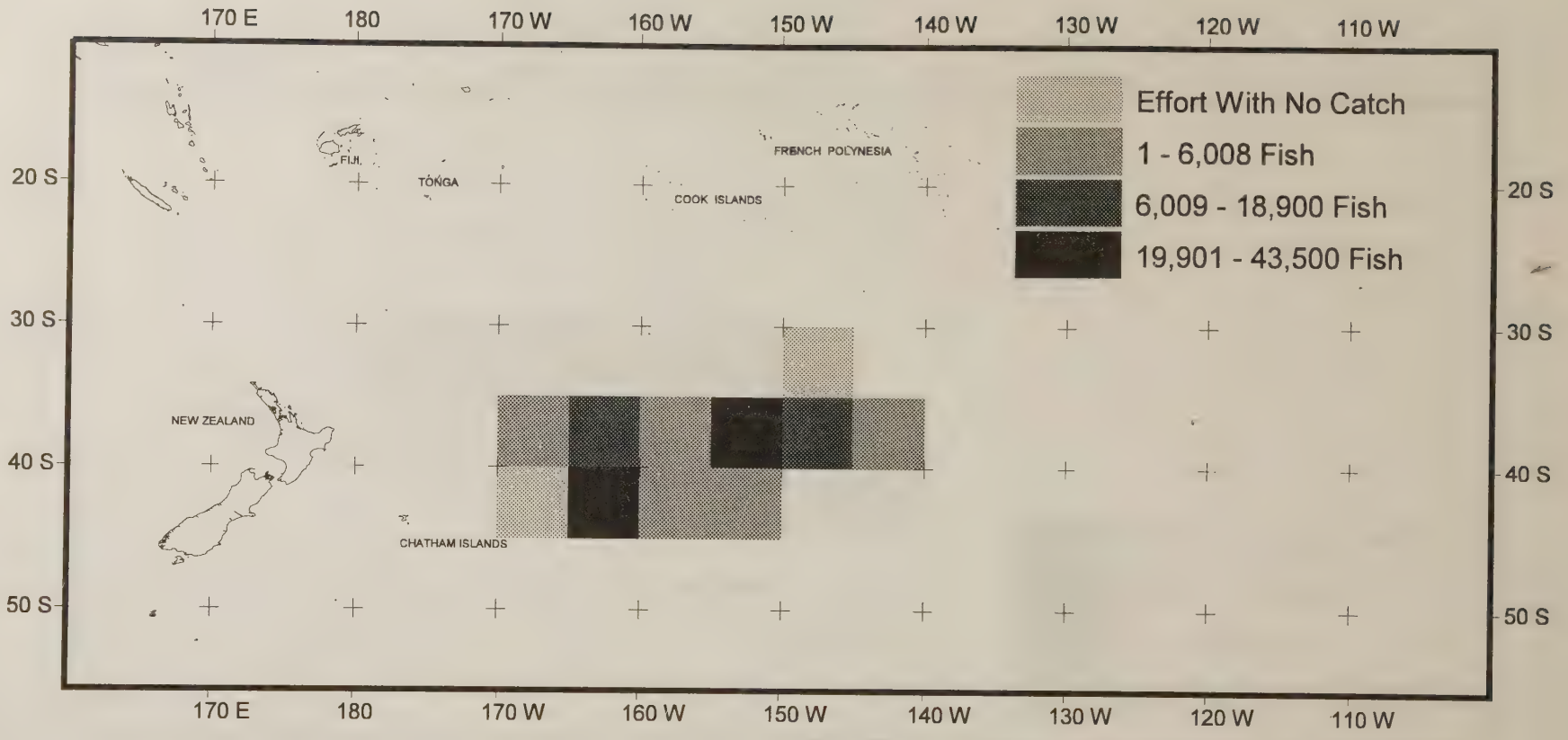

Figure 3c. Distribution of albacore catches by U.S. troll vessels in January 2000.

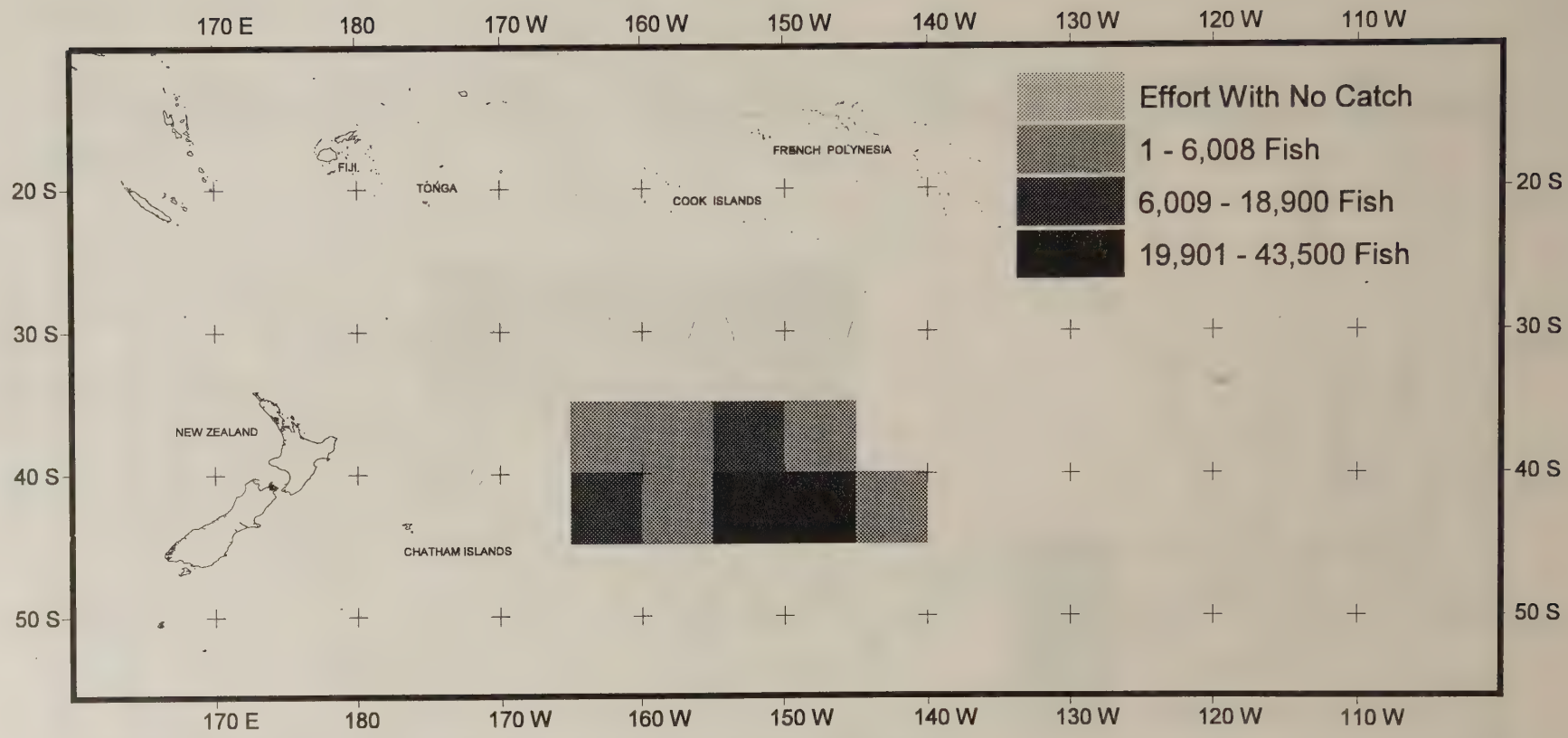

Figure 3d. Distribution of albacore catches by U.S. troll vessels in February 2000.

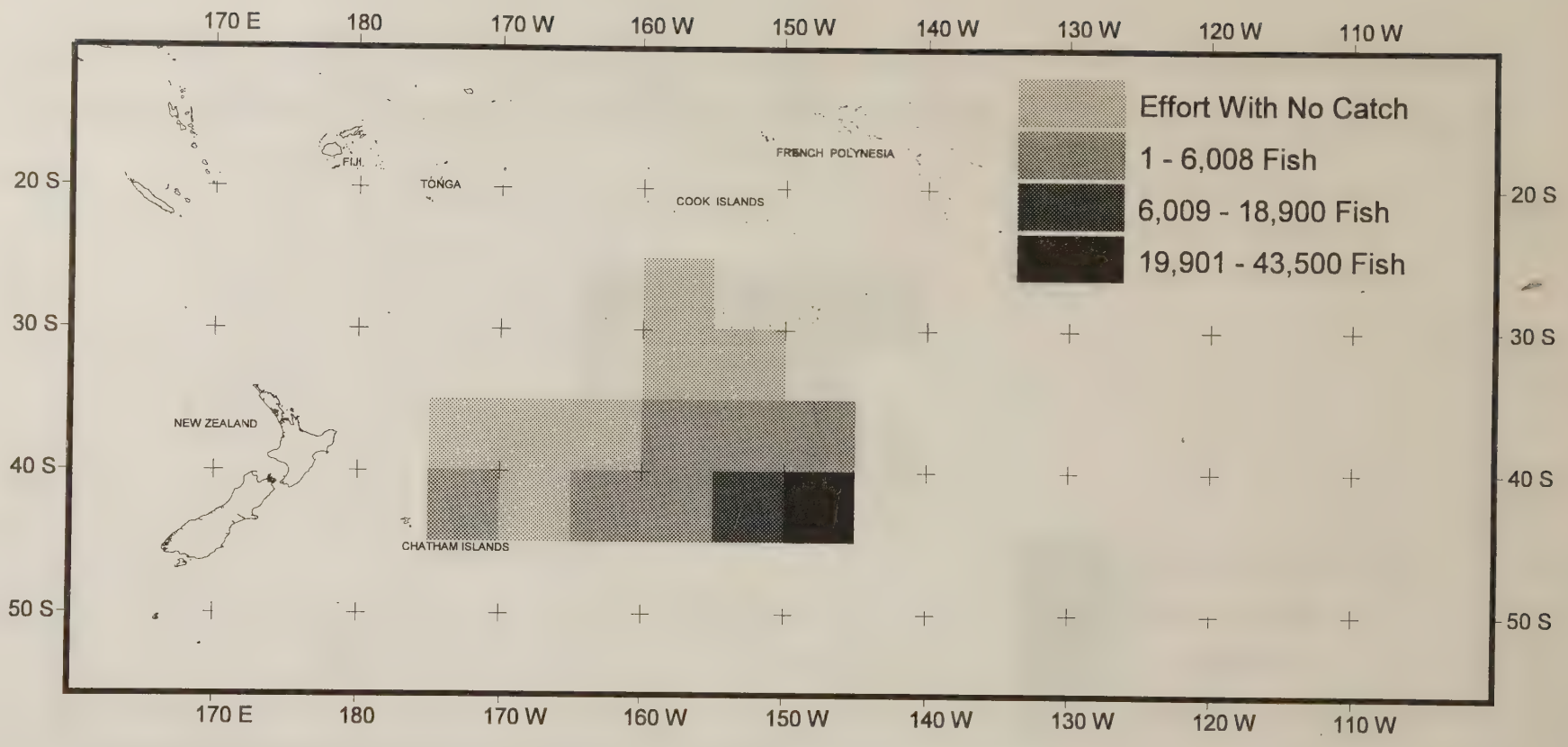

Figure 3e. Distribution of albacore catches by U.S. troll vessels in March 2000.

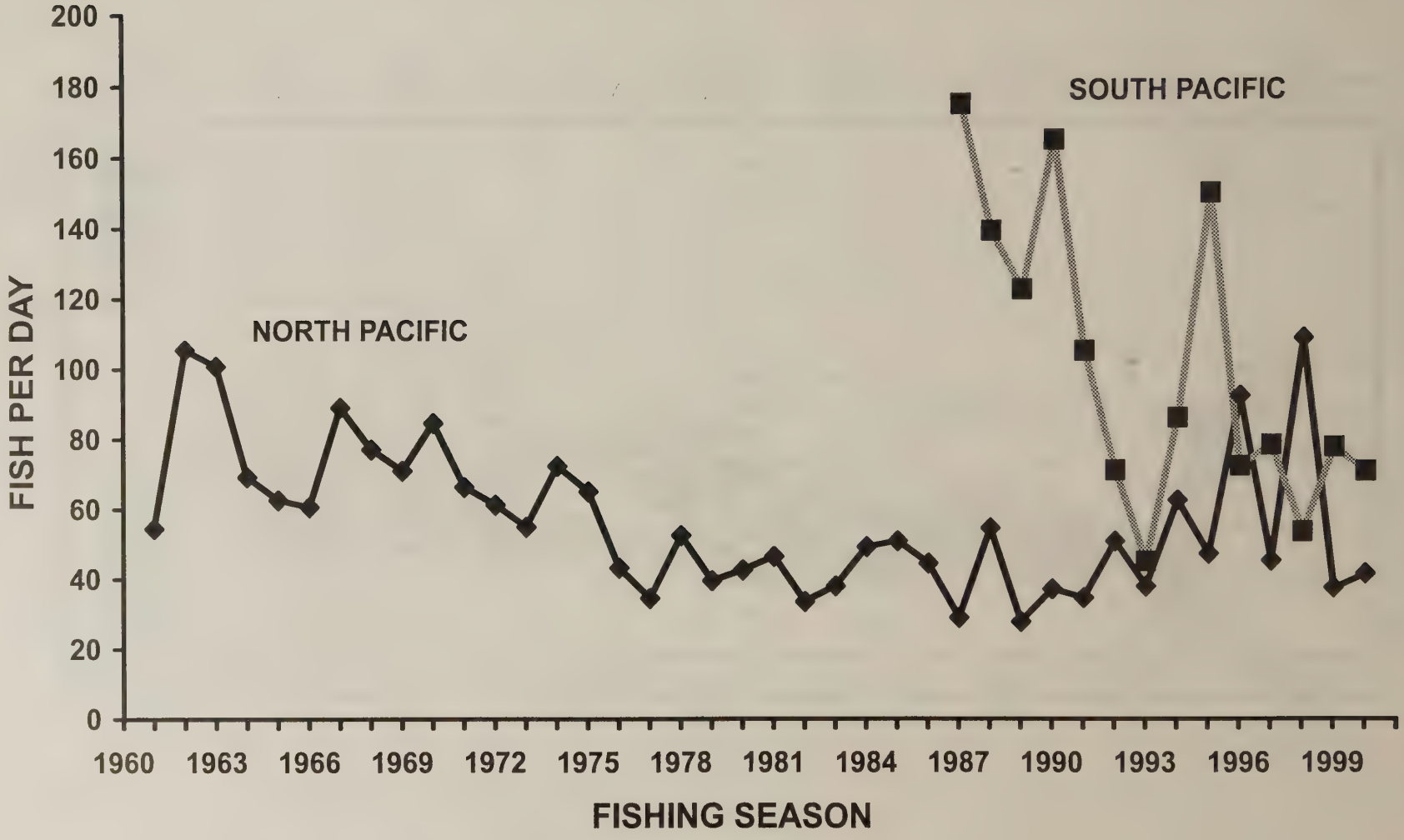

Figure 4. North and South Pacific albacore CPUEs by U.S. troll vessels from 1961 through 2000.

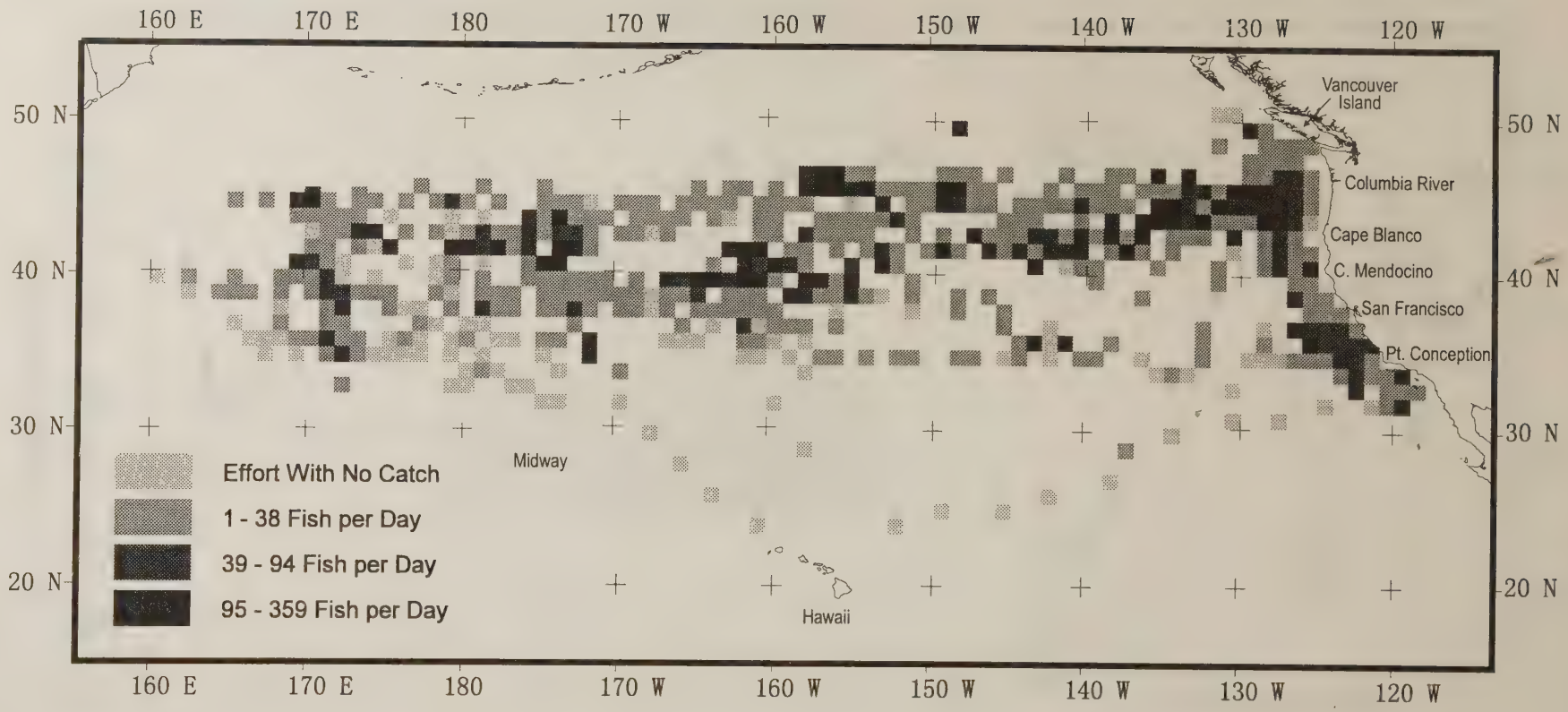

Figure 5a. Distribution of albacore CPUEs by U.S. troll vessels in the 2000 North Pacific season.

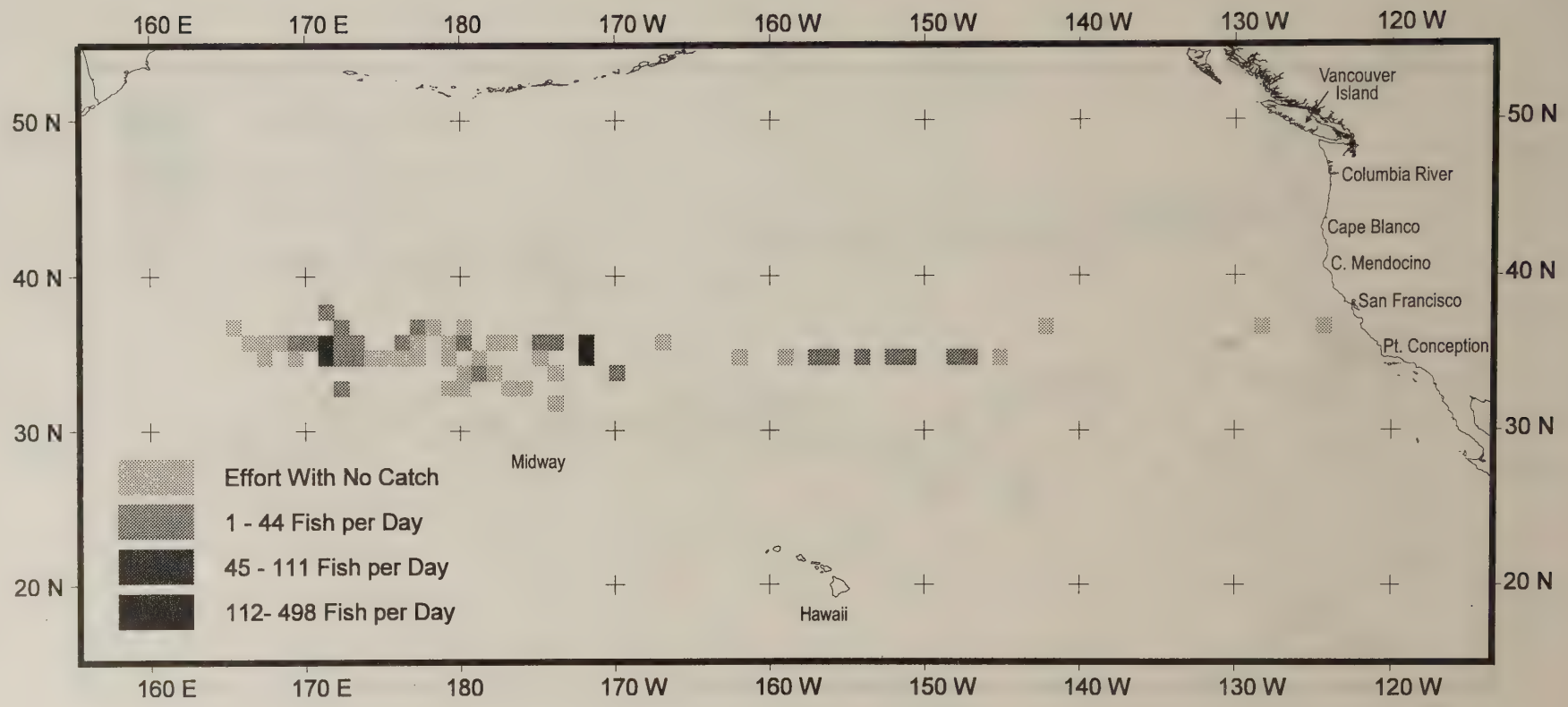

Figure 5b. Distribution of albacore CPUEs by U.S. troll vessels in May 2000.

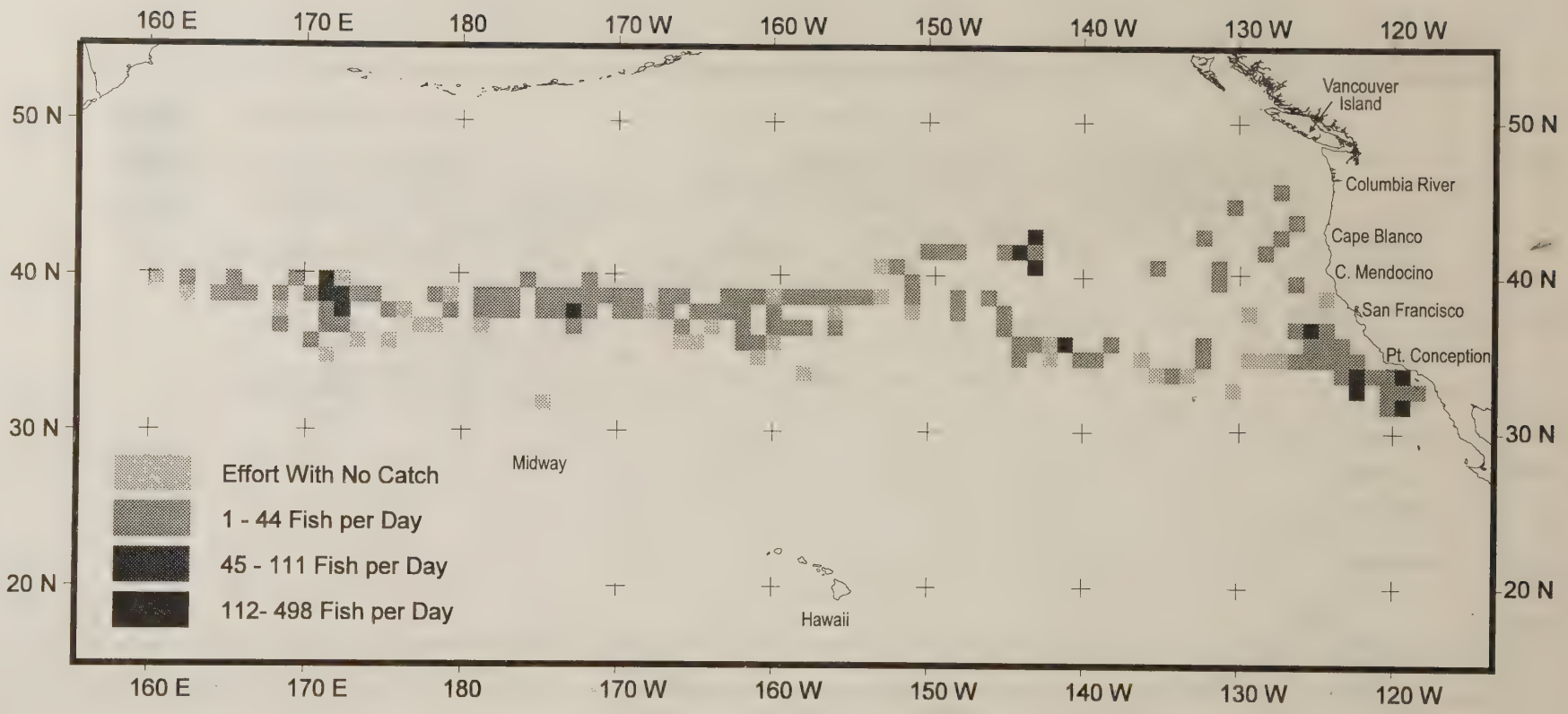

Figure 5c. Distribution of albacore CPUEs by U.S. troll vessels in June 2000.

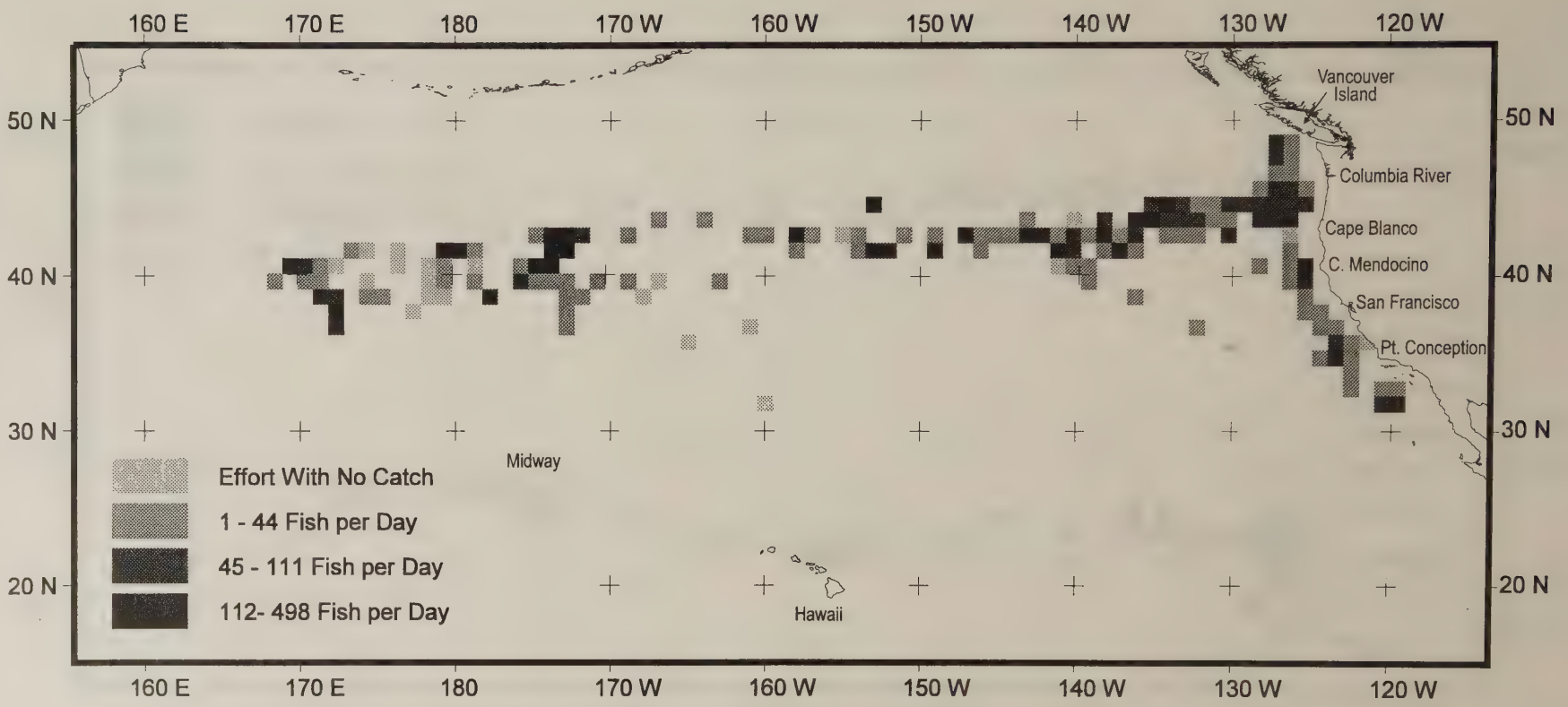

Figure 5d. Distribution of albacore CPUEs by U.S. troll vessels in July 2000.

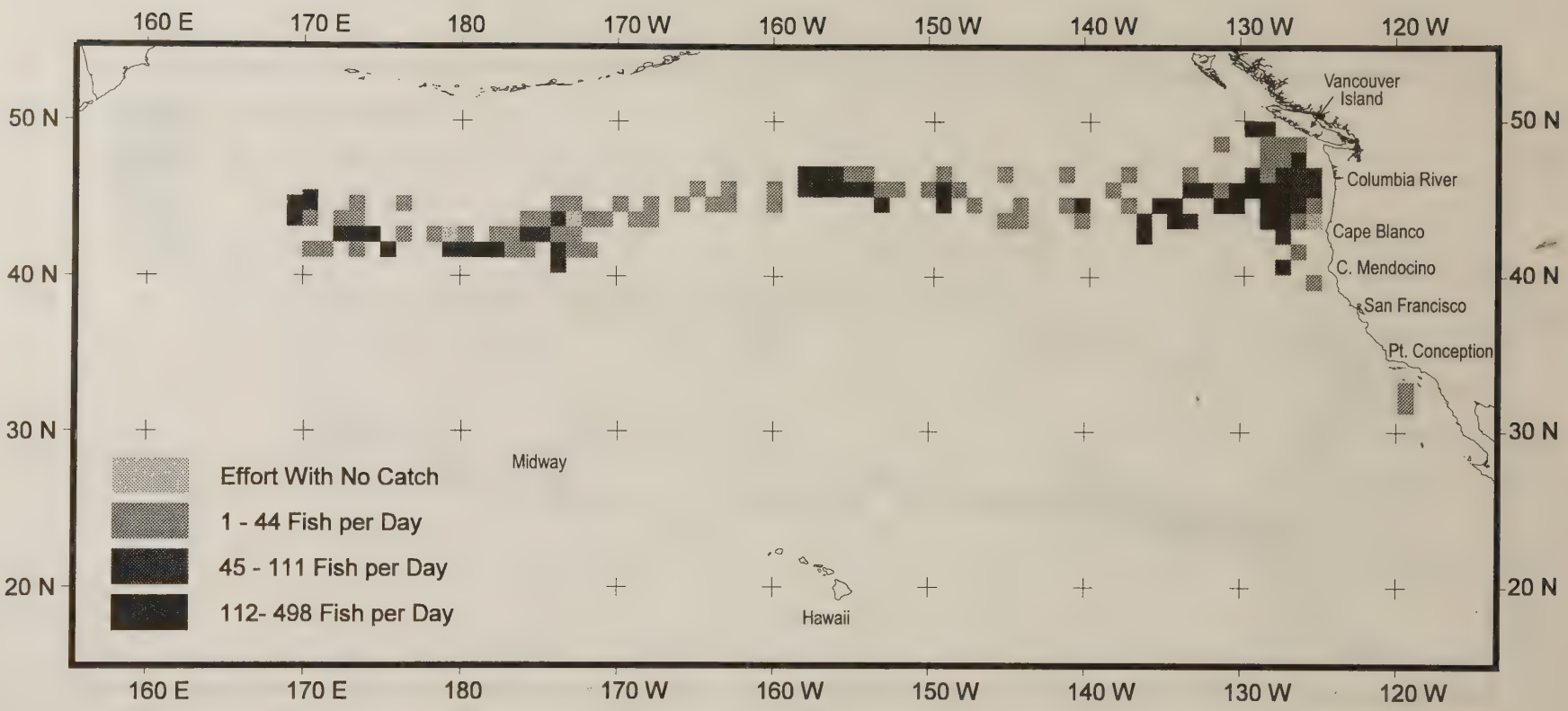

Figure 5e. Distribution of albacore CPUEs by U.S. troll vessels in August 2000.

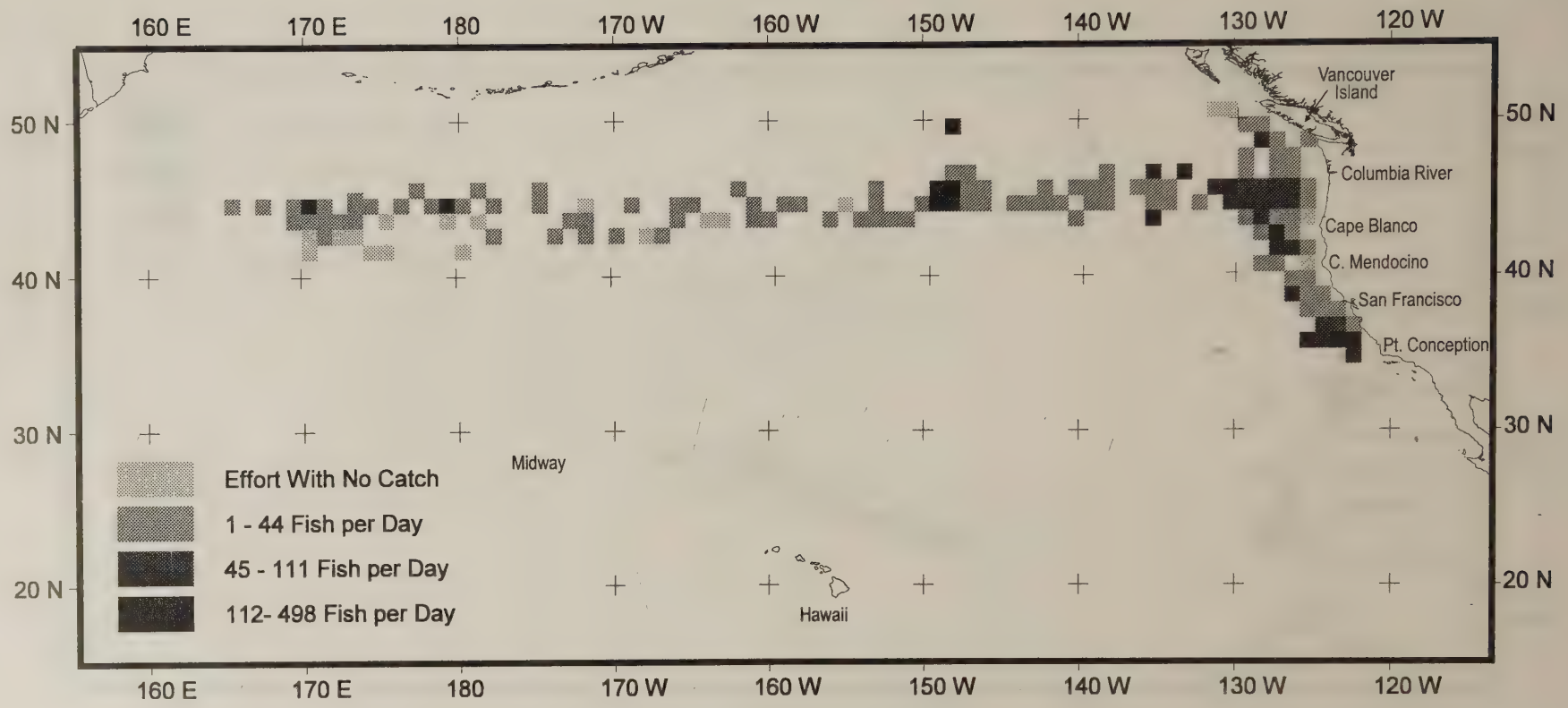

Figure 5f. Distribution of albacore CPUEs by U.S. troll vessels in September 2000.

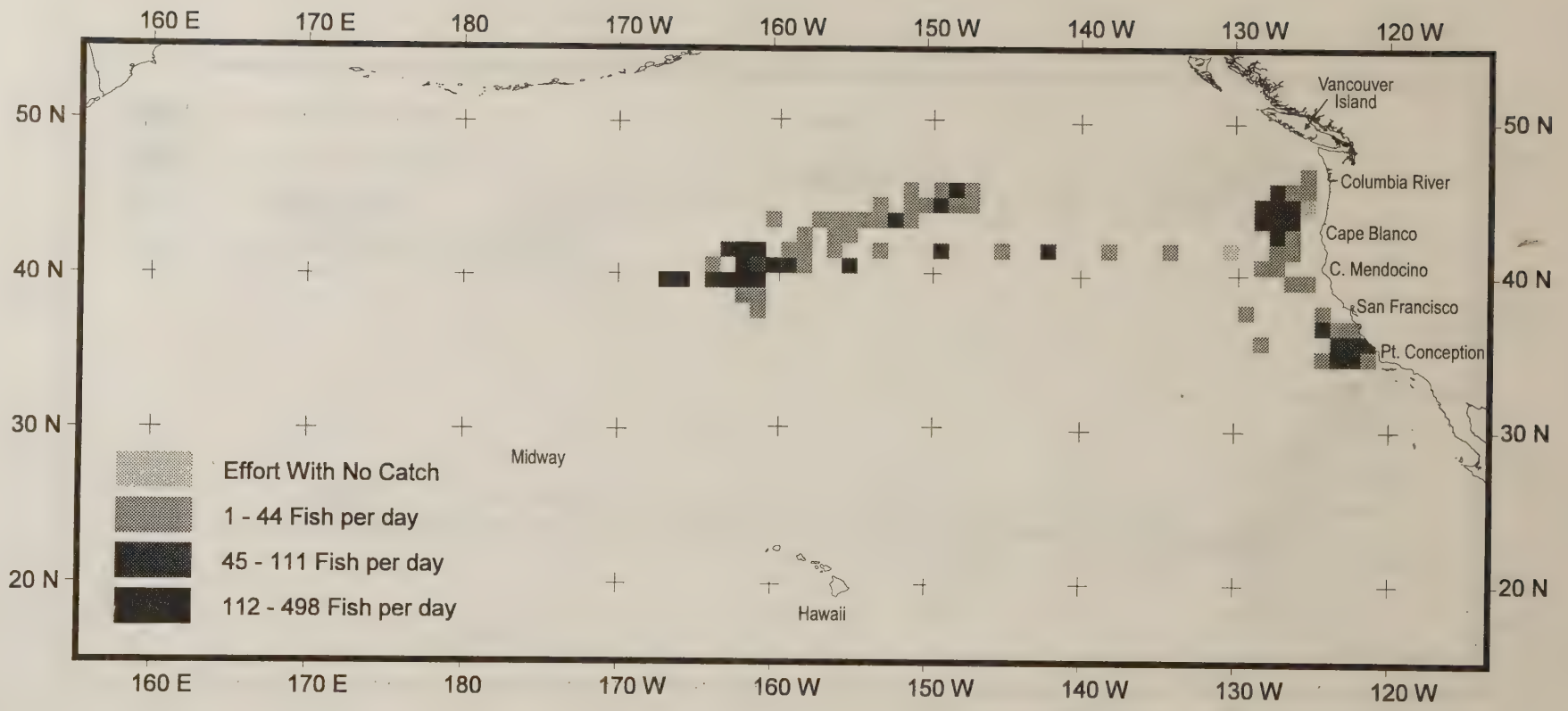

Figure 5g. Distribution of albacore CPUEs by U.S. troll vessels in October 2000.

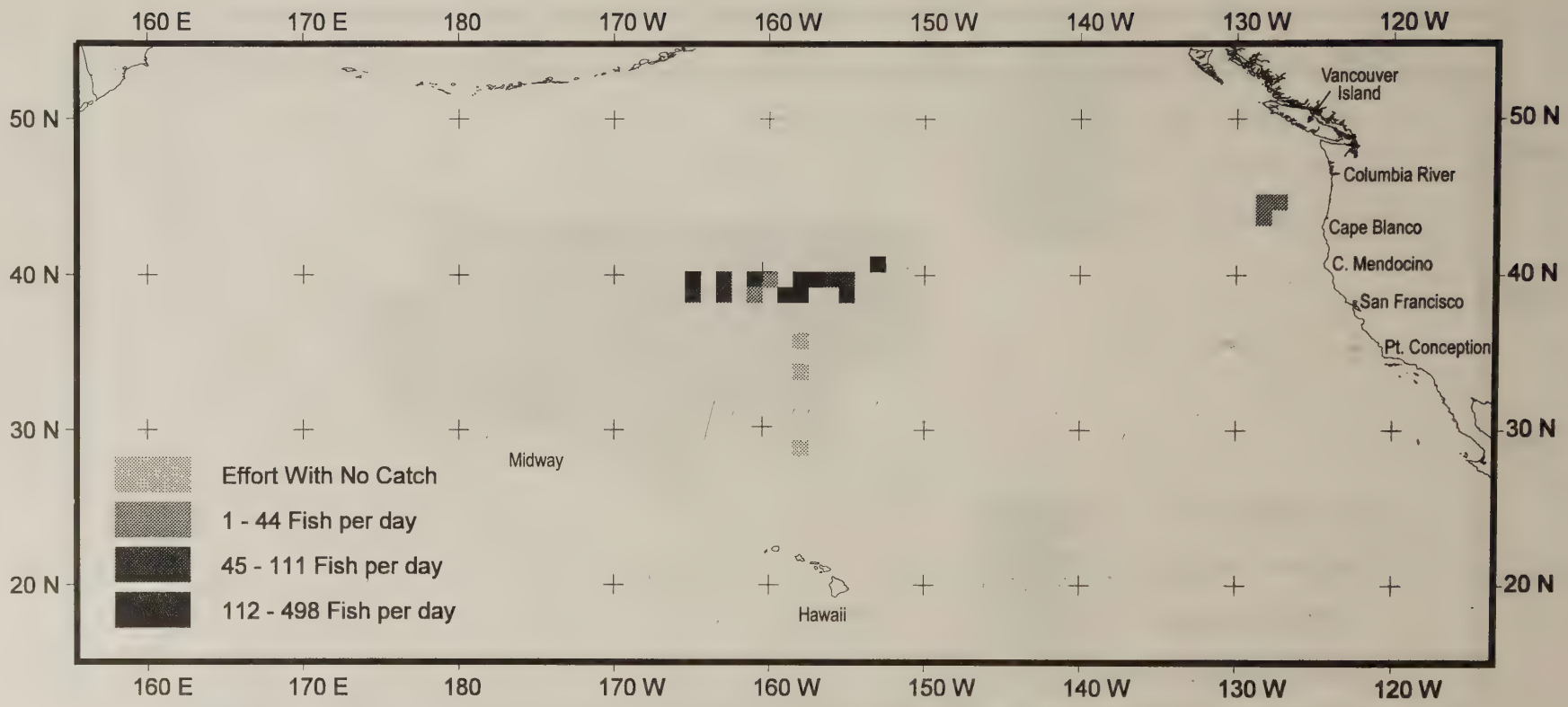

Figure 5h. Distribution of albacore CPUEs by U.S. troll vessels in November 2000.

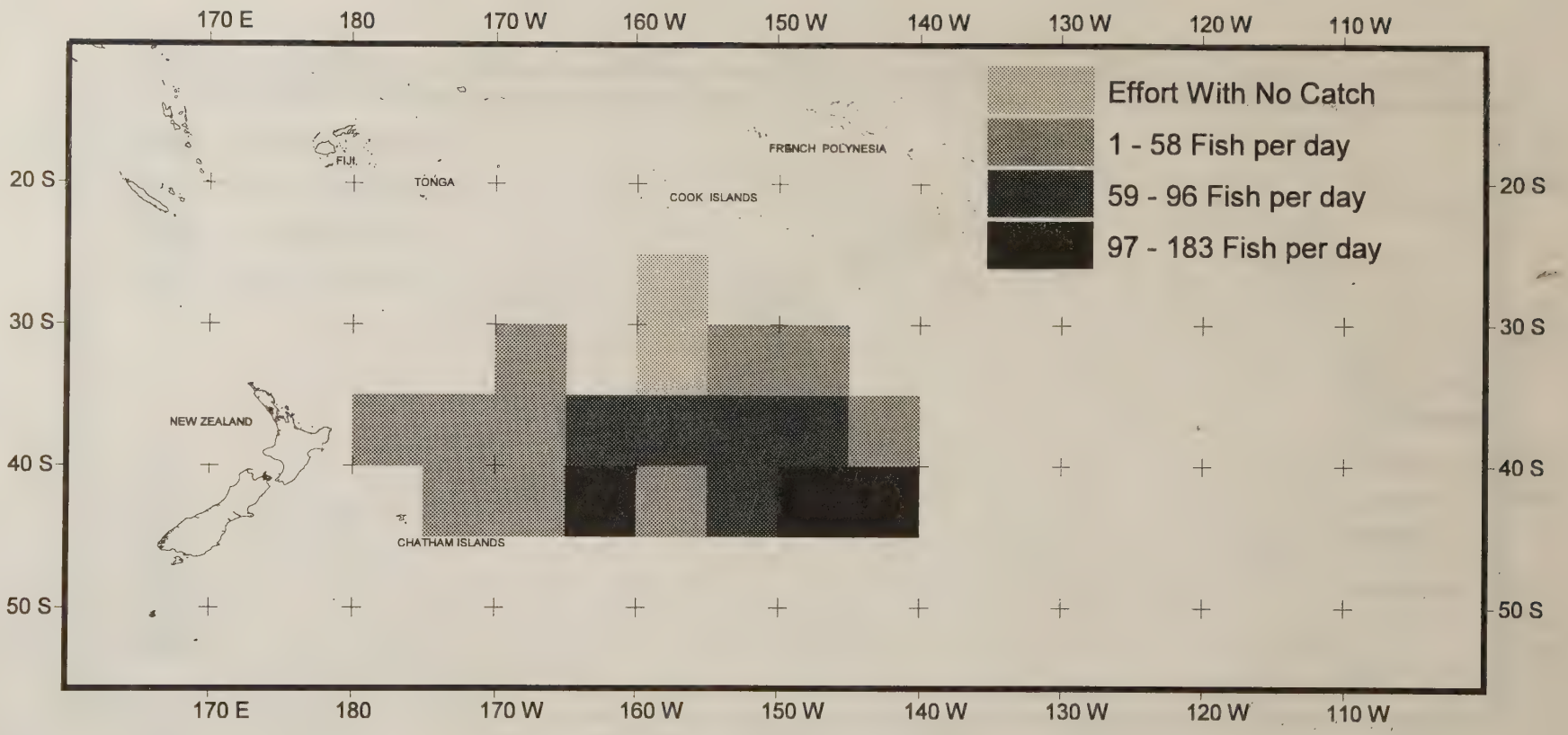

Figure 6a. Distribution of albacore CPUEs by U.S. troll vessels in the 1999-2000 South Pacific season.

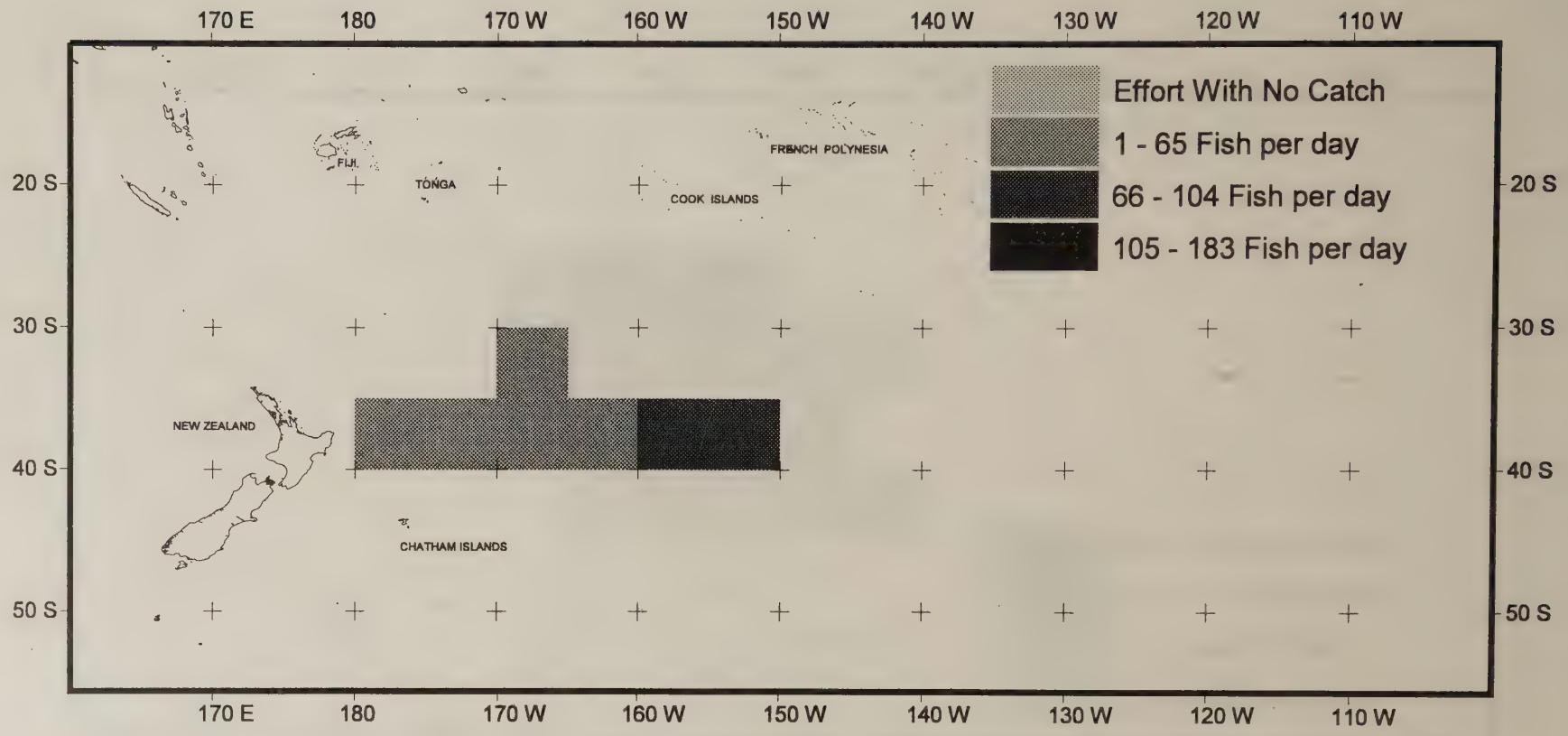

Figure 6b. Distribution of albacore CPUEs by U.S. troll vessels in December 1999.

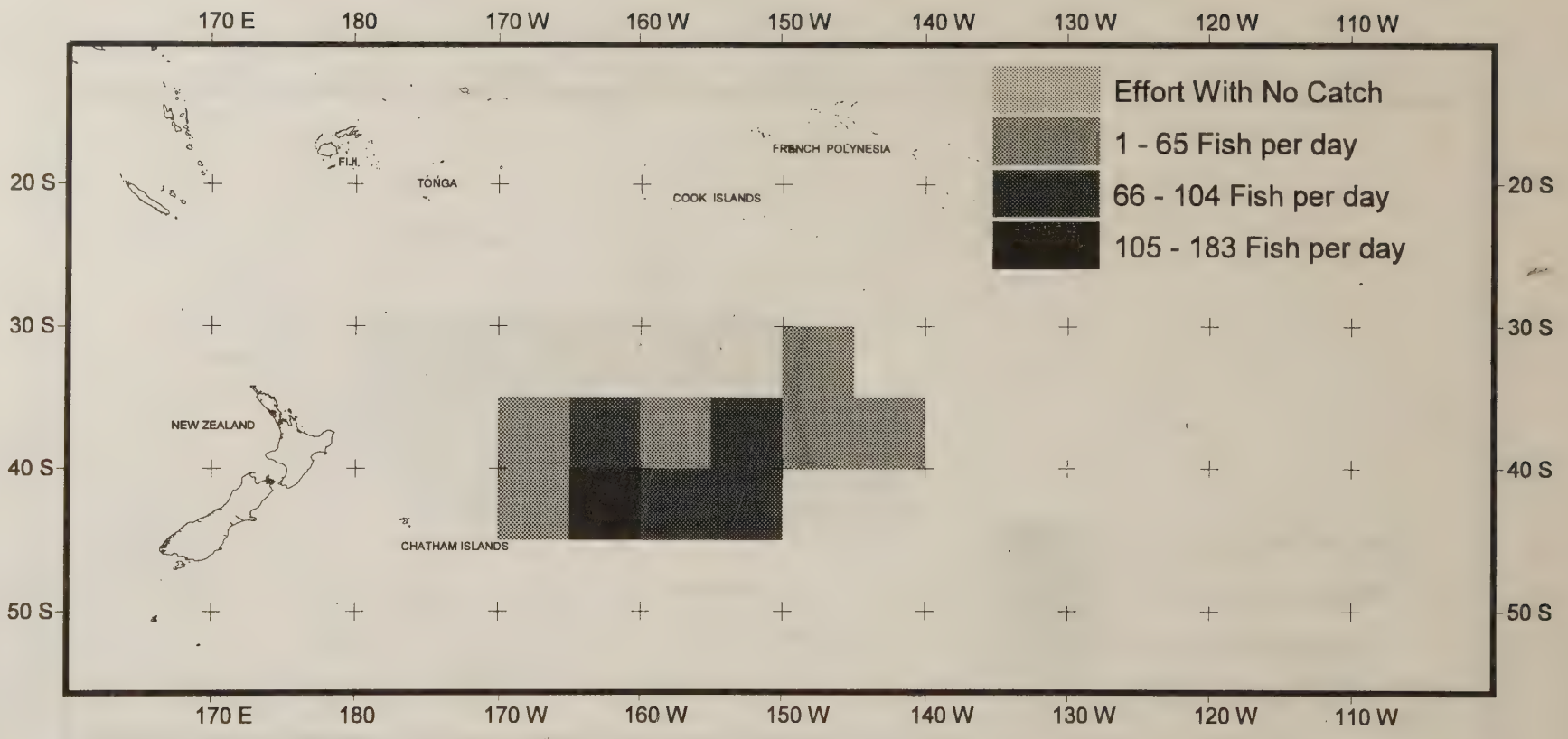

Figure 6c. Distribution of albacore CPUEs by U.S. troll vessels in January 2000.

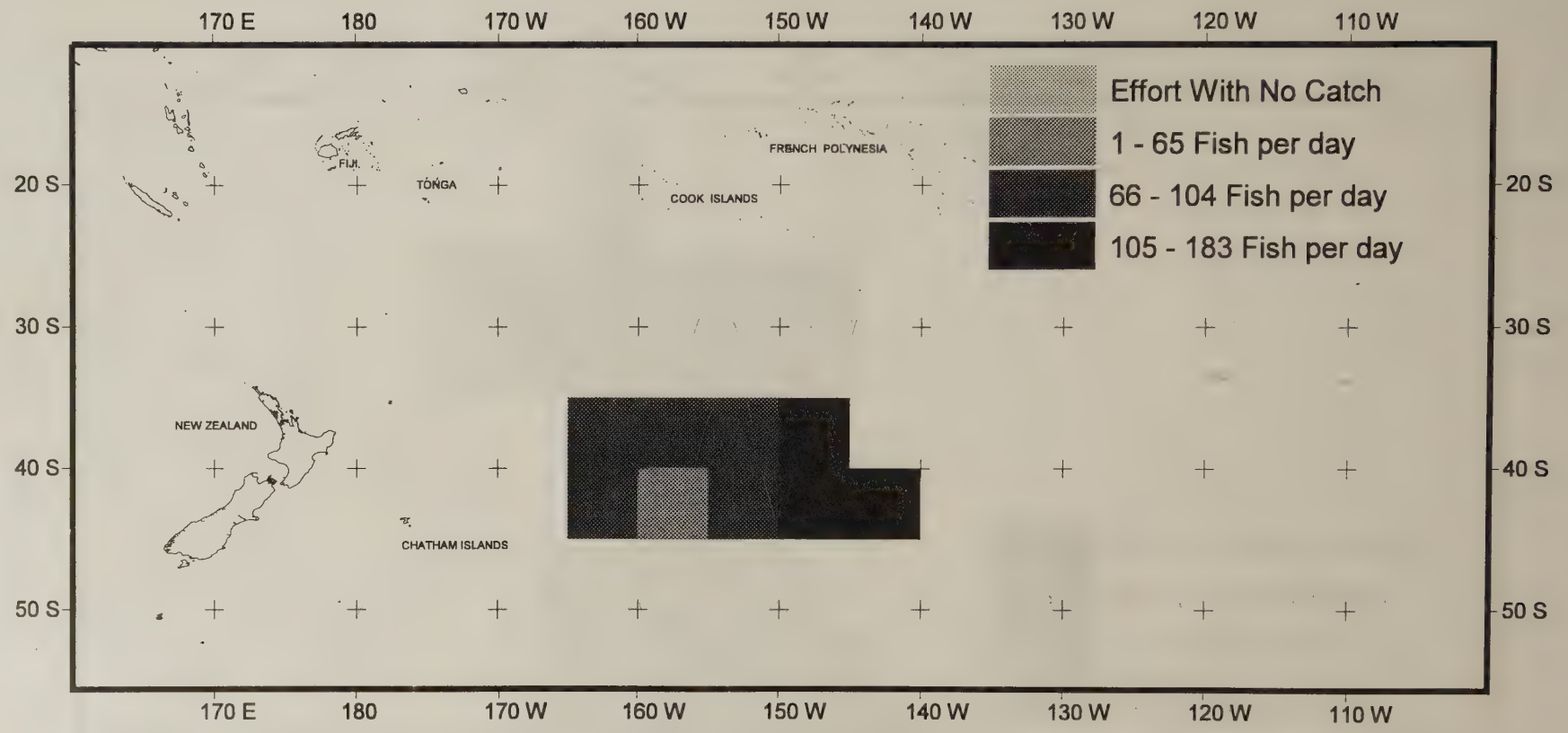

Figure 6d. Distribution of albacore CPUEs by U.S. troll vessels in February 2000.

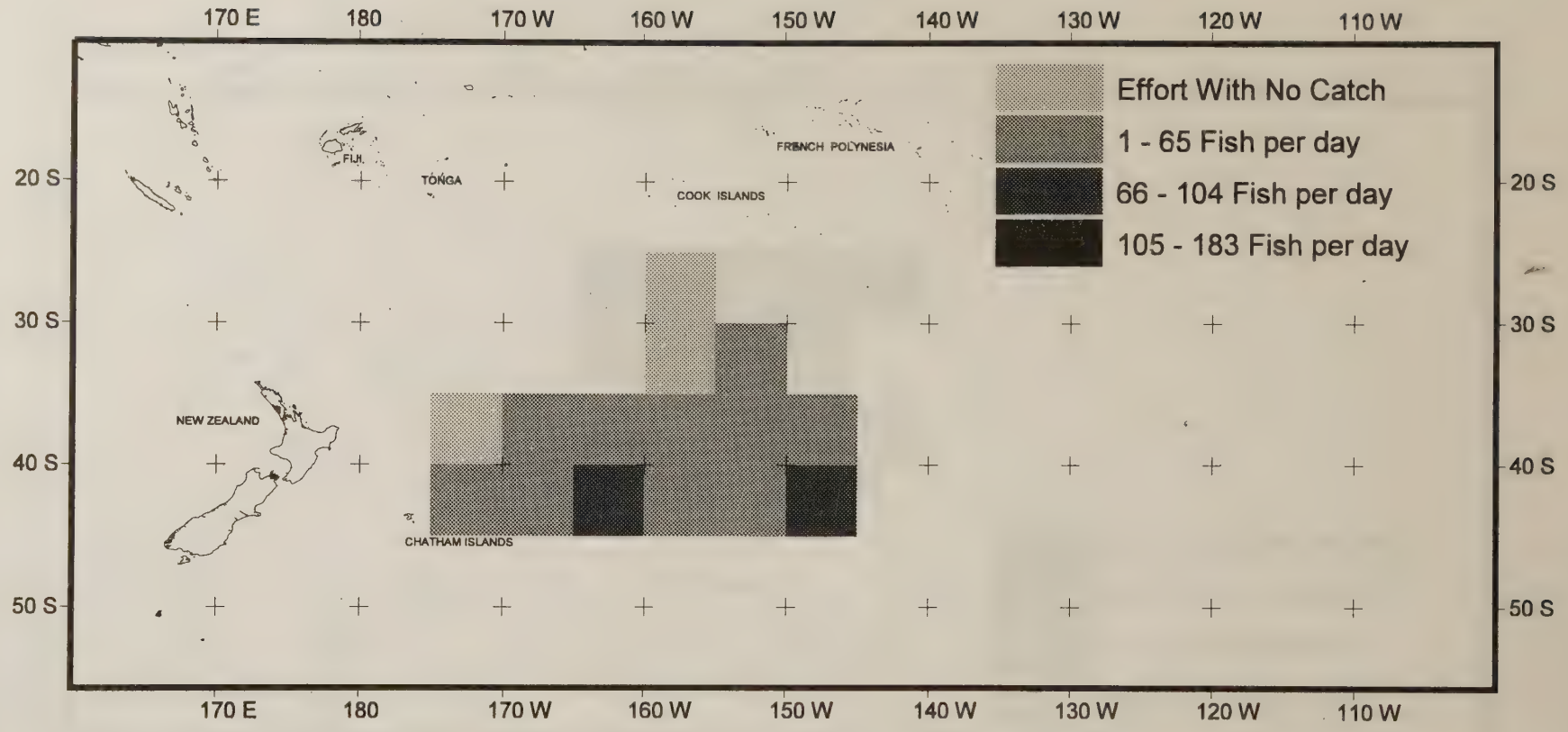

Figure 6e. Distribution of albacore CPUEs by U.S. troll vessels in March 2000.

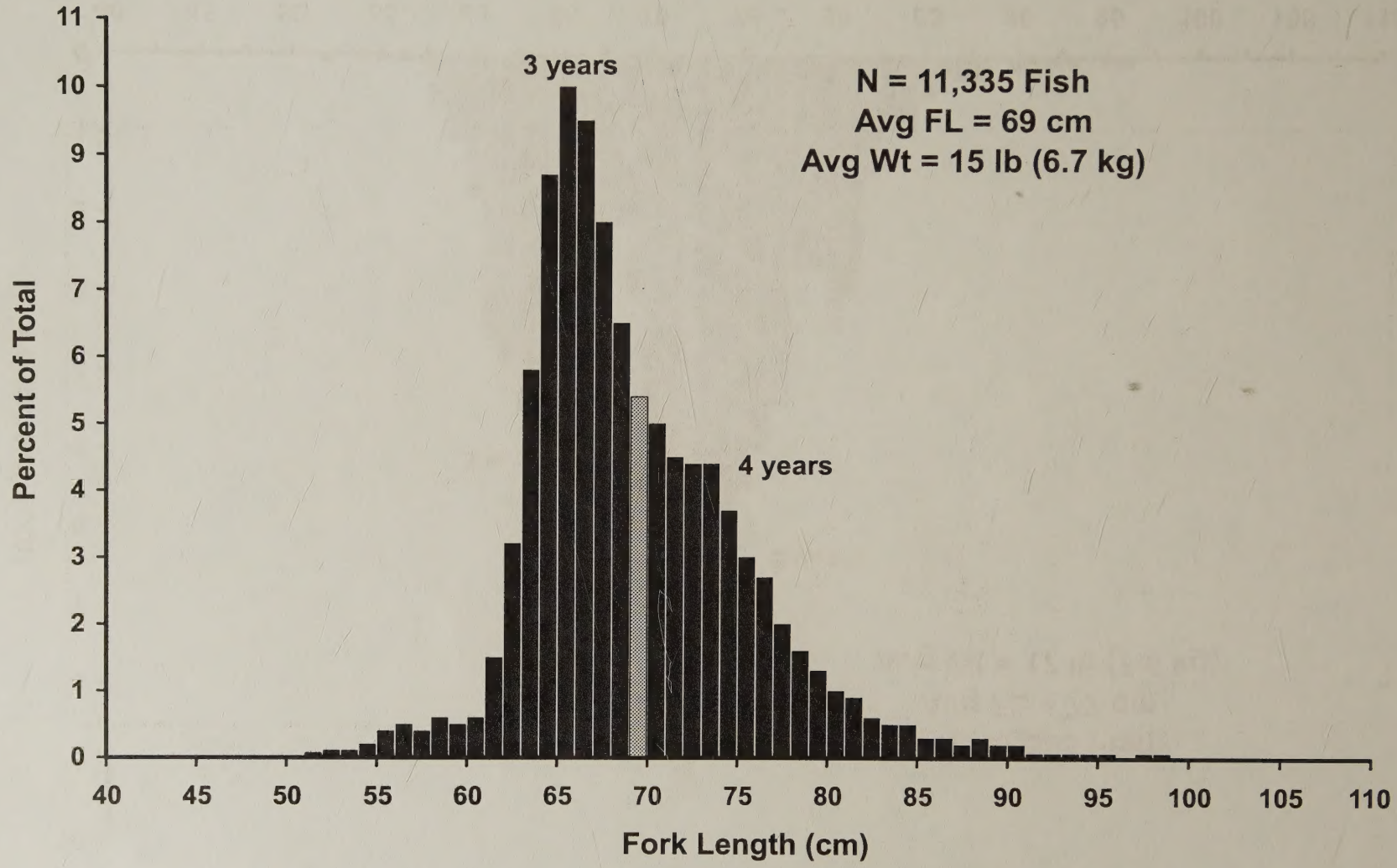

Figure 7. Length-frequency histogram of North Pacific albacore caught by U.S. troll vessels during the 2000 season.

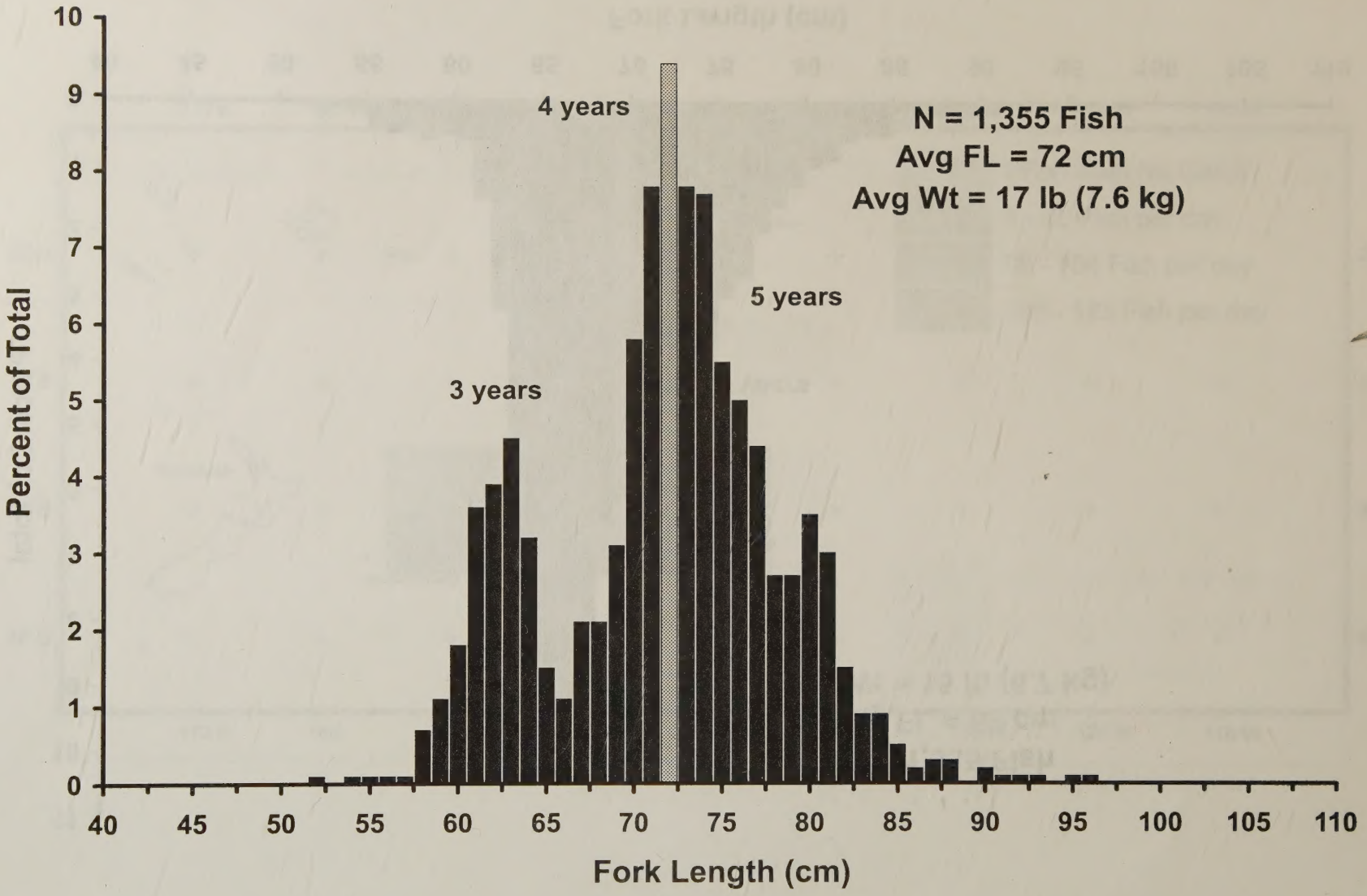

Figure 8. Length-frequency histogram of South Pacific albacore caught by U.S. troll vessels during the 1999-2000 season.